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CERTIFICATION D
NOVEMBER 1955—2,000

William Filar

REGISTER OF COPYRIGHTS

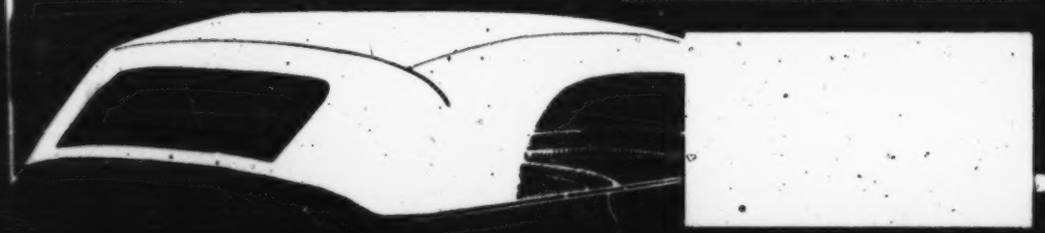
PLAINTIFF'S EXHIBIT NO. 7

491

MICRO CARD
TRADE MARK ®
22
MATTHEW BENDER & COMPANY
MB
60
862
microcard

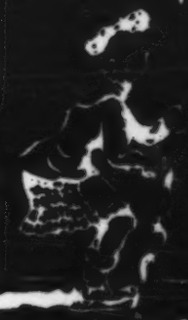
ARO PRODUCTS

"TOP Profits at a Minimum Investment"

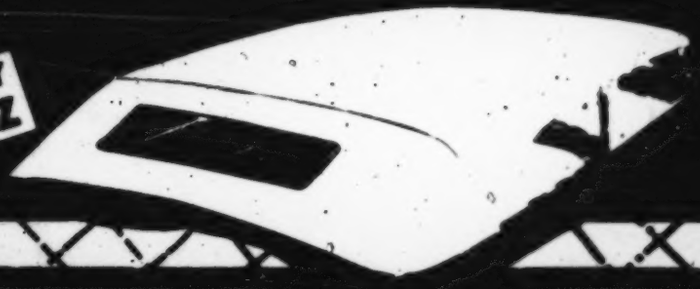


HOOT MON! HERE'S THE NEW

ARO **KILTY** TOP



FABRIC BY HAARTZ



ARO TOP PADS

and Rear Quarter Pads

ARO FRONT BOWS

HEADER RAILS

FOR FORDS and MERCURYS

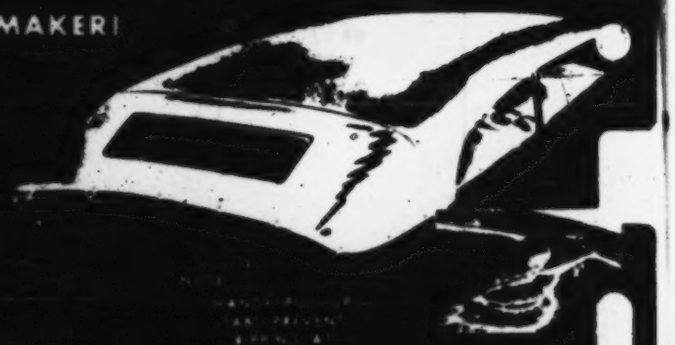
1938 to 1948

A YEAR ROUND MONEY MAKER!

ARO

Plastic

PROTECT-A-TOP



POINTS THE WAY TO TOP PROFITS

ARO CONVERTIBLE TOPS
ABOVE THEM ALL
World's Oldest and Largest Makers
UNEQUALLED!
ARO IS THE PIONEER MAKER OF
VERTIBLE TOPS THE WORLD'S
OUTSTANDING LEADER
HAARTZ FABRIC EXCLUSIVELY
ACCURATE
KNOW HOW
EASY INSTALLATION
THAT'S WHY ALTHOUGH
IMITATORS HAVE APPEARED
THERE'S NO REPLACEMENT
TOP LIKE AN ARO
ARO TOP SALES CO
ARO "STORM KING"
ARO "REGAL"
ARO "DE LUXE"
MODEL IDENTIFICATION

Famous ARO PRODUCTS.. Point the

CURRENT PRICE LIST

Cost Prices Are Listed by Letter A, B, C, etc.
Consult Current Price Bulletin for Key

FORD MERCURY LINCOLN

GENERAL MOTORS

GENERAL MOTORS Continued

GENERAL MOTORS CONVERTIBLE SEDAN

CHRYSLER MOTORS

ALL TOPS COMPLETE WITH FABRIC CURTAINS — PLASTIC CURTAIN ADDITIONAL

USING FABRIC BY HAARTZ Exclusively!

No finer fabric than HAARTZ
No finer top than ARO

ARO *Convertible Tops are Available for all cars from 1928 Year to Current Models*

Famous ARO CONVERT

FORD—MERCURY—LINCOLN

GENERAL MOTORS

GENERAL MOTORS (continued)

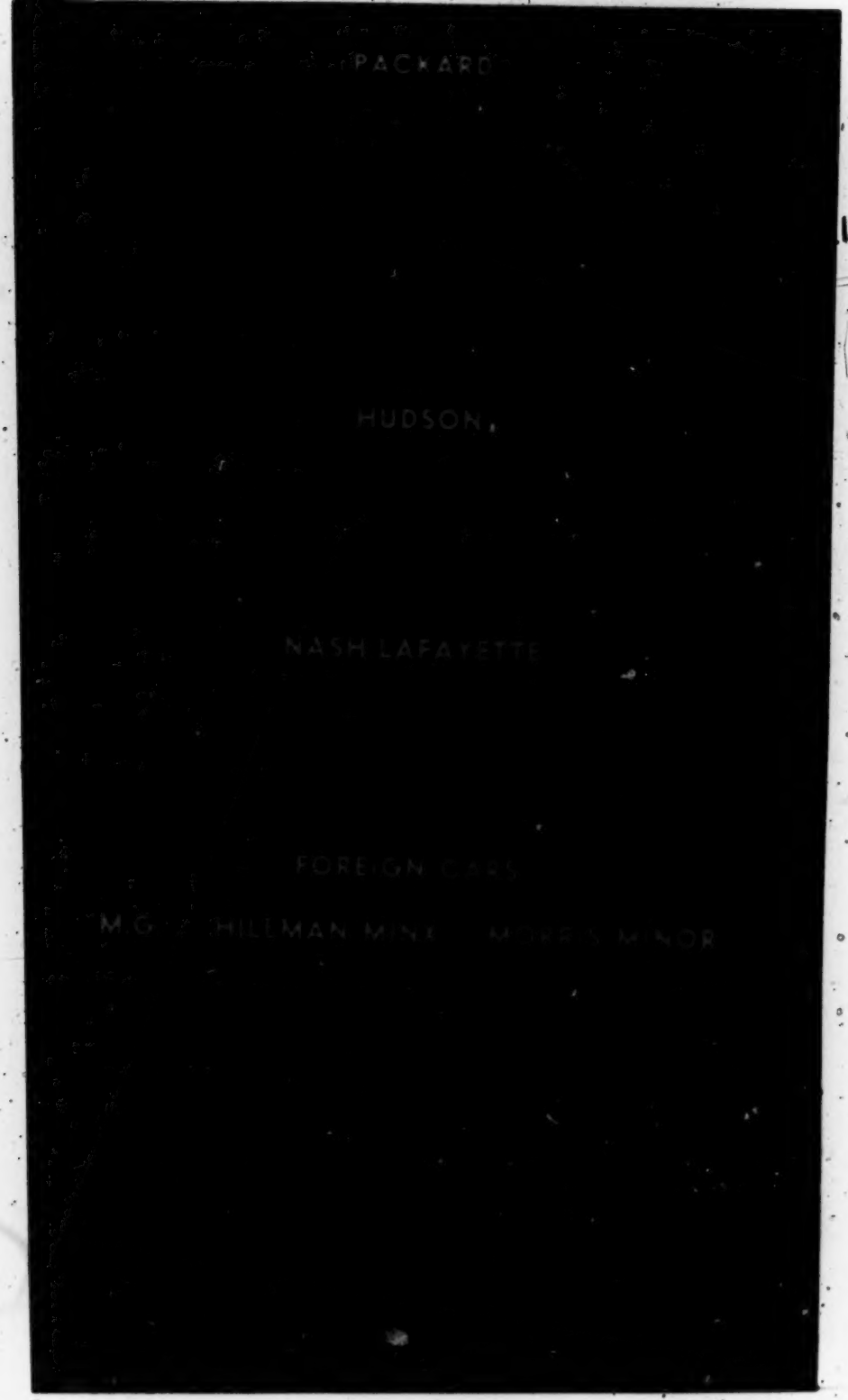
CHRYSLER MOTORS

STUDEBAKER

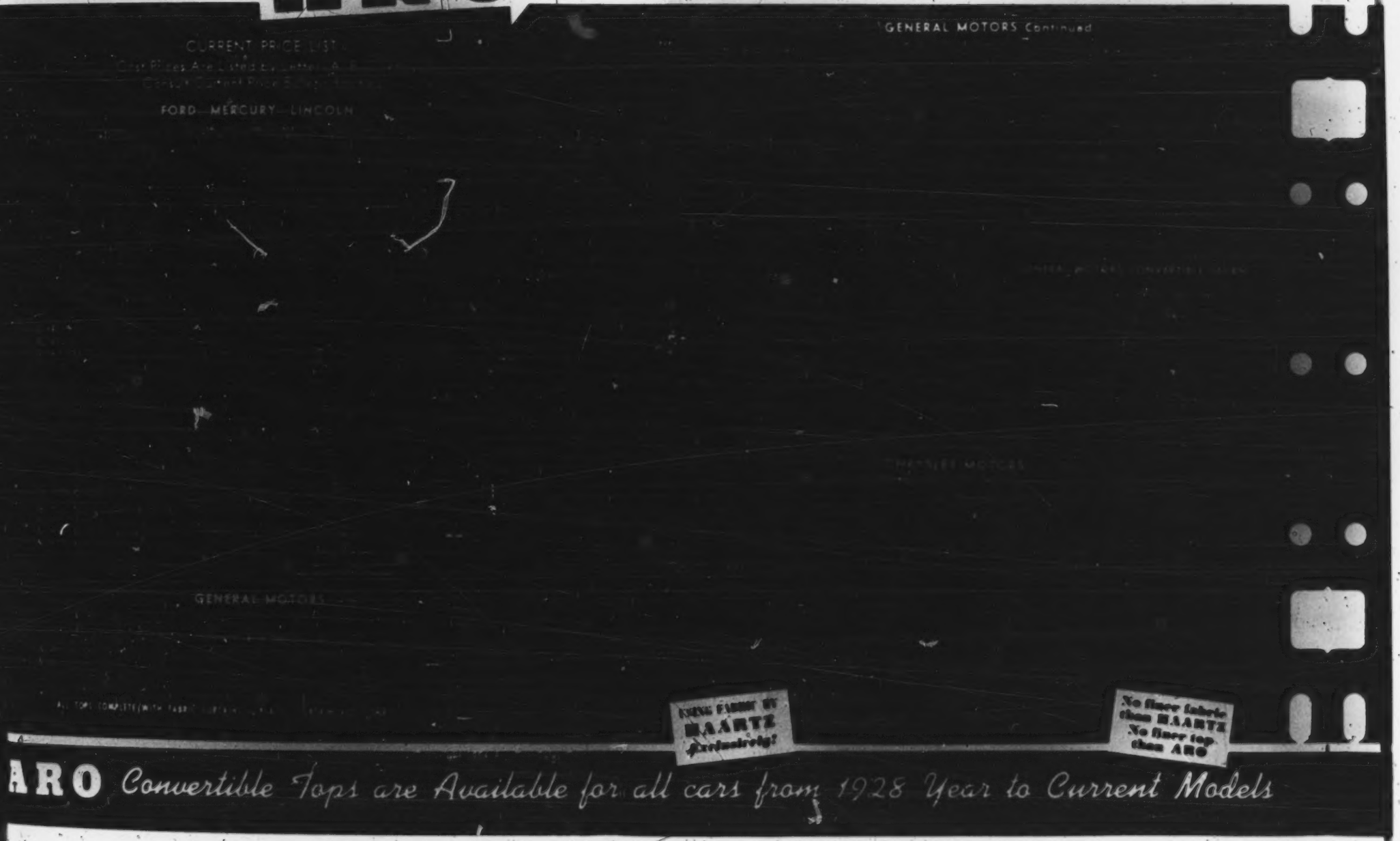
WILLYS

CROSLEY

TIBLE TOPS


PACKARD
HUDSON
NASH LAFAYETTE
FOREIGN CARS
M.G. HILLMAN MINX MORRIS MINOR

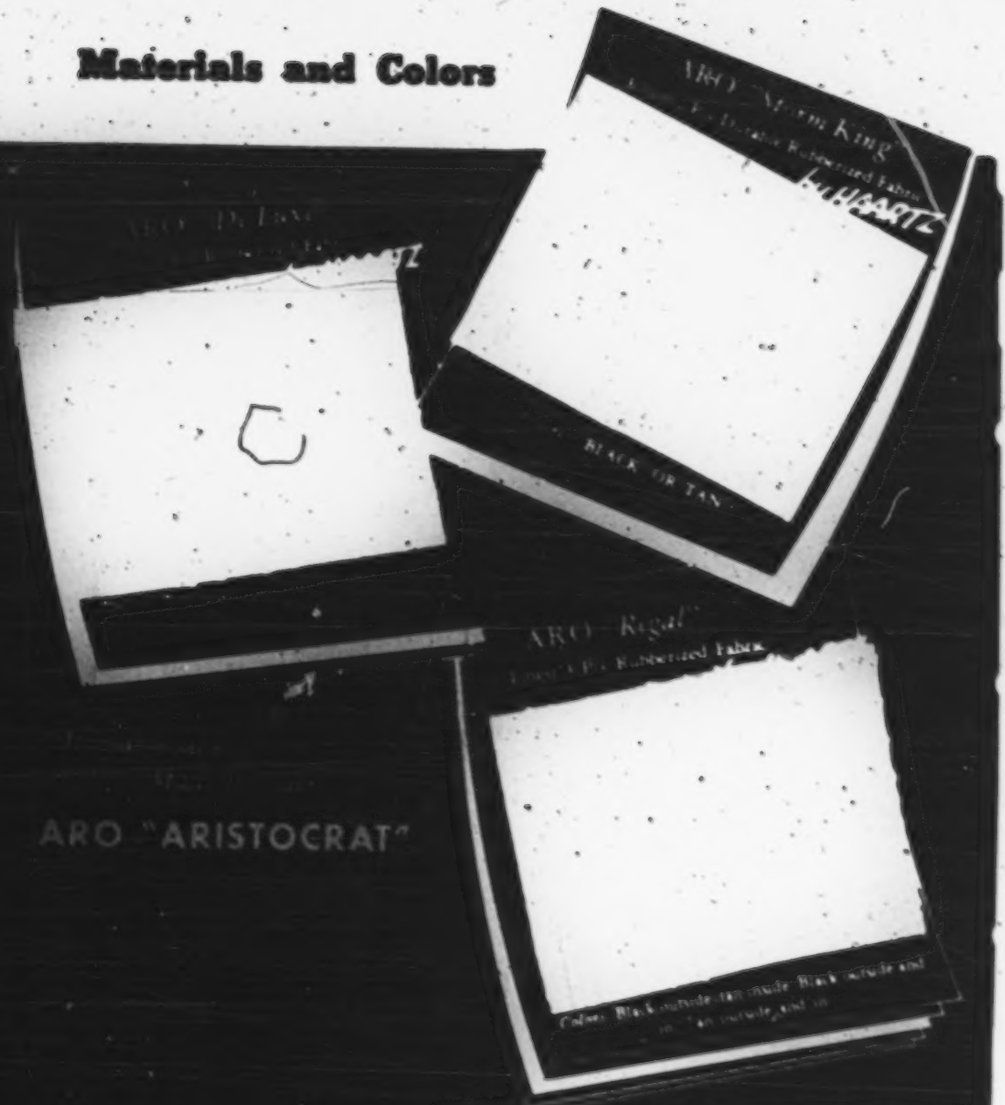
Famous ARO PRODUCTS.. Point the



ARO *Convertible Tops are Available for all cars from 1928 Year to Current Models*

Way to Higher Profits

Materials and Colors



ARO "ARISTOCRAT"

ARO "HARMONY"

ARO FABRICS COME FROM THE SAME MANUFACTURER THAT SUPPLIES OVER 90% OF DETROIT'S AUTO MAKERS

ARO TOP SALES CO.
Telephone ALgonquin 4-5250

1089 COMMONWEALTH AVE
BOSTON 15, MASS

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CERTIFICATION D
NOVEMBER 1954—5,000

Arthur Fisher

REGISTER OF COPYRIGHTS

PLAINTIFF'S EXHIBIT NO. 8

467

ARO PRODUCTS

"TOP Profits at a Minimum Investment"

ARO *Plastic* PROTECT-A-TOP

ARO TOP PADS

and Rear Quarter Pads

ARO FRONT BOWS

HEADER RAILS

FOR FORDS and MERCURYS

1938 to 1948

ARO

WORLD'S OLDEST AND LARGEST MAKERS OF REPLACEMENT CONVERTIBLE TOPS

Reasons for ARO TOP Leadership:

1
2
3
4

AND ARO TOPS ARE MADE EXCLUSIVELY OF

FAMOUS HAARTZ JONARTS SPORTS FABRIC

ARO TOP SALES CO 1089 Commonwealth Ave BOSTON 15 MASS

Phone Algonquin 5-52

PLAINTIFF'S EXHIBIT NO. 9a

[Letterhead, Moore and Hall]

January 2, 1954

Registered—Return
Receipt Requested

President
Aro Manufacturing Company
1089 Commonwealth Avenue
Boston, Massachusetts

Dear Sir:

Our client, Automobile Body Research Corporation of Ruxton, Maryland, a corporation of Maryland, is the owner of United States Patents 2,549,153 and 2,569,724. The first of these patents has been held valid and infringed in the case of *Ackermans* v. *General Motors Corporation*, 202 F.2d 642. Petition for a writ of certiorari filed by General Motors Corporation was denied, as was a petition for rehearing.

During the settlement of the General Motors case, we acquired from General Motors Corporation for the sum of $80,000.00 the Mackie and Duluk Patent 2,569,724.

We have reserved the right to license those replacement fabrics for convertible automobiles which, if sold without any consent on the part of the patentee, would constitute contributory infringement (under 35 U.S.C. 271) of the Ackermans patent. While General Motors Corporation has reserved a non-exclusive license under Patent 2,569,724, no other licenses are outstanding. It is obvious, from the foregoing and from an inspection of the convertible automobile sold by the Ford Motor Company, that anyone selling ready-made replacement fabrics for these automobiles would be guilty of contributory infringement of said patents. We understand that you have been selling such fabrics and also ready-made fabrics for General Motors convertibles. If this be the case, you have, therefore, been

guilty of contributory infringement of the aforesaid Ackermans Patent 2,549,153.

General Motors Corporation has agreed to pay us a 5% royalty on replacement fabrics which it manufactures for its cars, and which would constitute contributory infringement of said Ackermans patent.

We are willing to grant you or your suppliers a license under both of the aforesaid patents for a 5% royalty. The royalty is to be computed on only those replacement fabrics which would constitute contributory infringement if sold without the patentee's consent.

Sincerely yours,
William D. Hall

WDH:tp

PLAINTIFF'S EXHIBIT NO. 9b

[Letterhead, Ezekiel Wolf]

February 23, 1954.

Moore & Hall
1200 Eighteenth Street, Northwest
Washington 6, D.C.

Gentlemen:

Your letter of January 2, 1954 addressed to President, Aro Manufacturing Company, 1089 Commonwealth Avenue, Boston, Massachusetts, has been referred to me for reply.

We have briefly considered the two patents which you mentioned in your letter and can state that my clients would be willing to consider a license under the patents mentioned if they could be assured that they would be fully protected to the extent that infringers of these patents would be vigorously prosecuted for infringement unless they also became licensees on the same basis.

We should be glad to hear from you on the basis as outlined above.

Very truly yours,
(s) Ezekiel Wolf

EW/r

PLAINTIFF'S EXHIBIT NO. 9d

[Letterhead, Ezekiel Wolf]

May 10, 1954.

Moore & Hall
1200 Eighteenth Street, Northwest
Washington 6, D.C.

Re: *Aro Manufacturing Co.*

Gentlemen:

In response to your letter of May 8, 1954, I am enclosing herewith a new rough sketch of the construction used by the Aro Manufacturing Company in connection with automobiles having guide bars as disclosed in the Mackie patent.

You will of course understand that not all automobiles use the particular construction as disclosed in this patent and that the replacement top manufactured by the Aro Manufacturing Company is adaptable for use with automobiles of entirely different construction.

In the construction utilized by the Aro Top Manufacturing Company, the fabric material is provided with a flap as previously disclosed. This flap fits over the top of the body line and acts quite similar to a shingle element. In installing this top in automobiles having elements similar to those as shown in Figure 2 of the Mackie patent, the rubber molding elements 27 are first removed in order to make room for the flap member.

It is true the guide bars 10 and 11 are allowed to remain. However these guide bars in the replacement construction as made by the Aro Manufacturing Company, operate in an entirely different fashion than as originally designed and claimed in that patent.

In a replacement arrangement this acts solely as a guide bar and not as a wiping arm for pressing the top material against the inside of a sealing strip. In view of this distinct difference in operation, we again repeat there cannot be any reasonable basis for a claim of infringement.

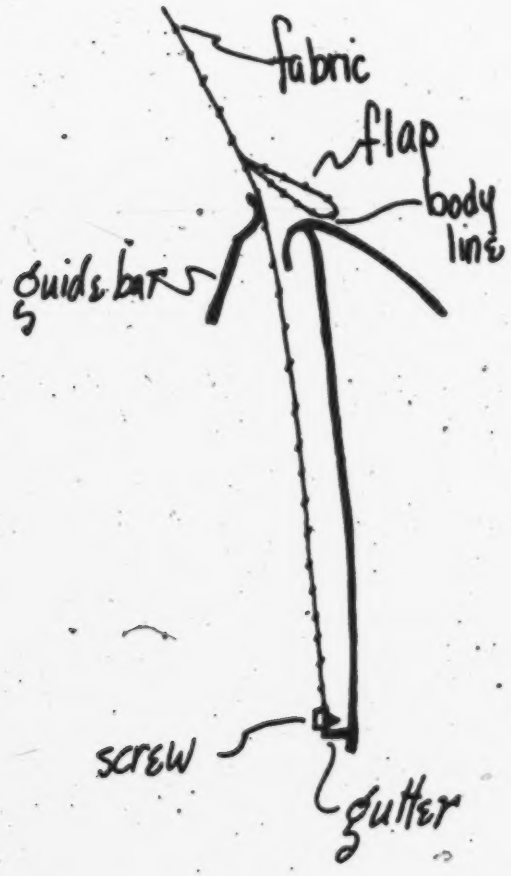
I have called to the attention of our clients, your difficulty of seeing one of the Aro Manufacturing Company's tops installed on a car, and I feel certain that the Aro Manufacturing Company would be glad to show to one of your representatives such an installation at its factory here in Boston.

Thank you very much for your kind consideration.

Sincerely yours,

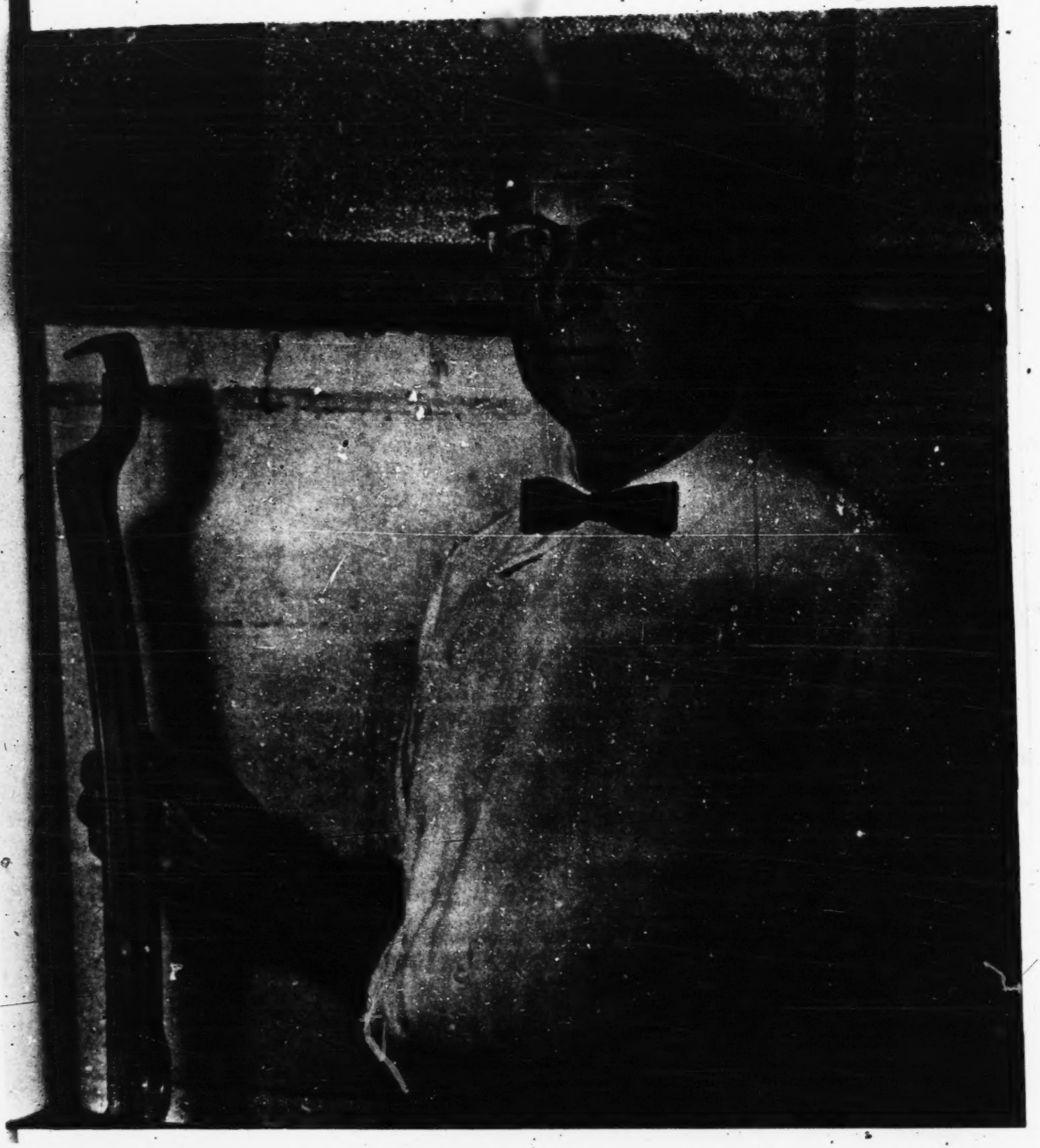
(s) EZEKIEL WOLF

DW/r



PL. Ex. 4

PLAINTIFF'S EXHIBIT NO. 18



ALL TOPS COMPLETE WITH FABRIC CURTAIN — PLASTIC CURTAIN ADDITIONAL
ARO Convertible Tops are Available for

TRIMS FABRIC BY
HAARTZ
Exclusively!
No finer fabric than HAARTZ
No finer top than ARC
all cars from 1928 Year to Current Models

PLAINTIFF'S EXHIBIT NO. 19

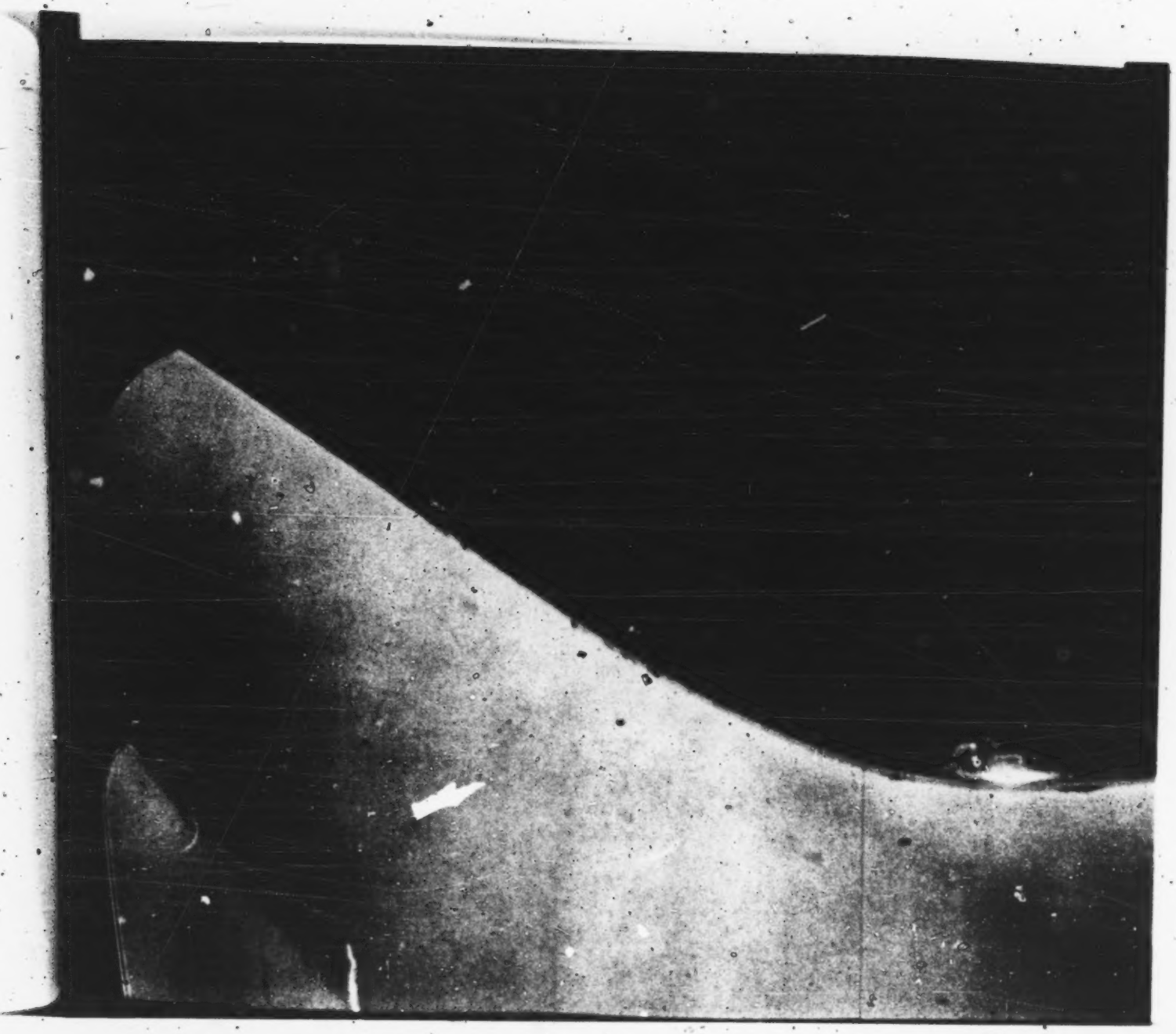
PLAINTIFF'S EXHIBIT NO. 20
184

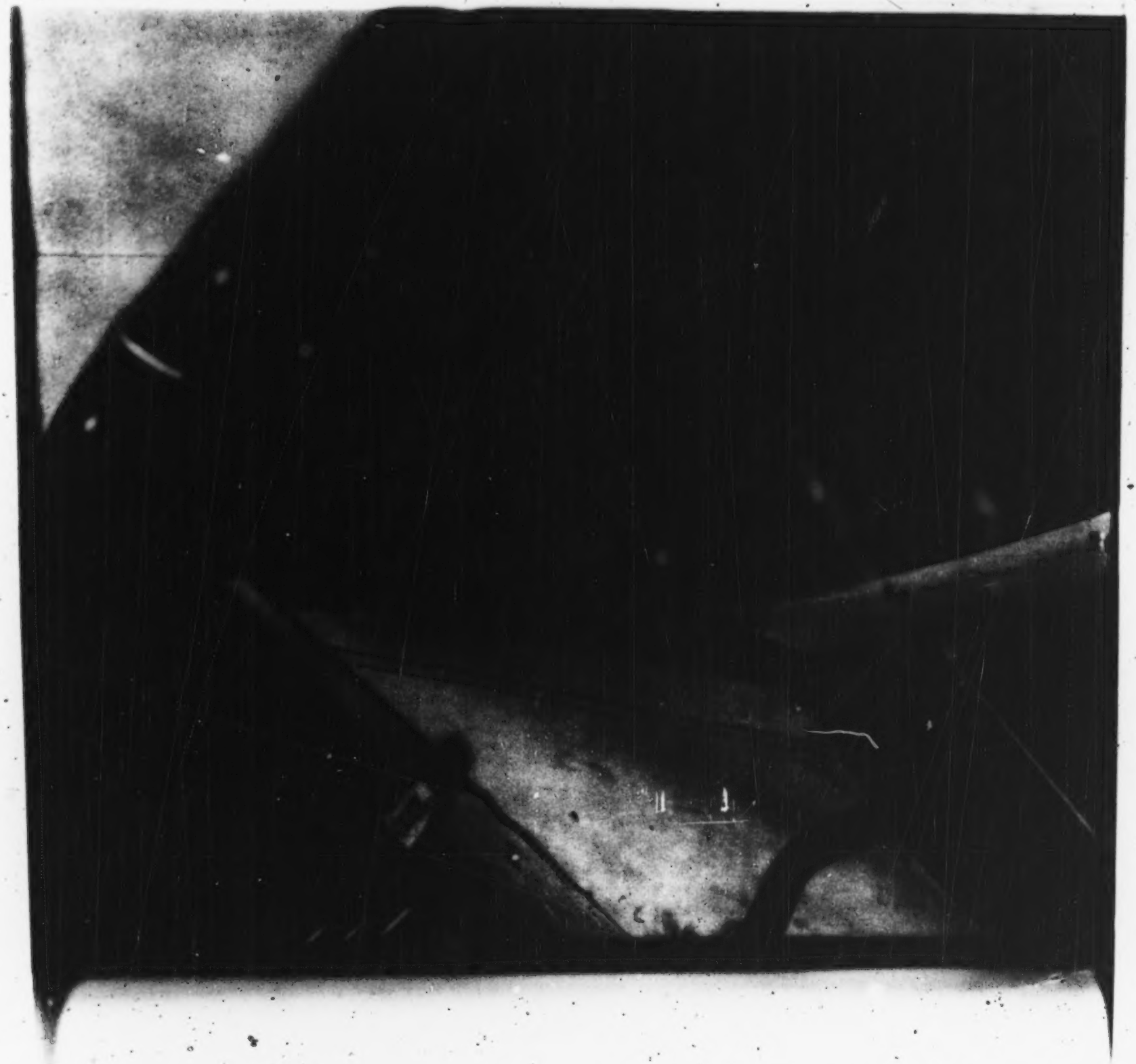
PLAINTIFF'S EXHIBIT NO. 21

PLAINTIFF'S EXHIBIT NO. 22

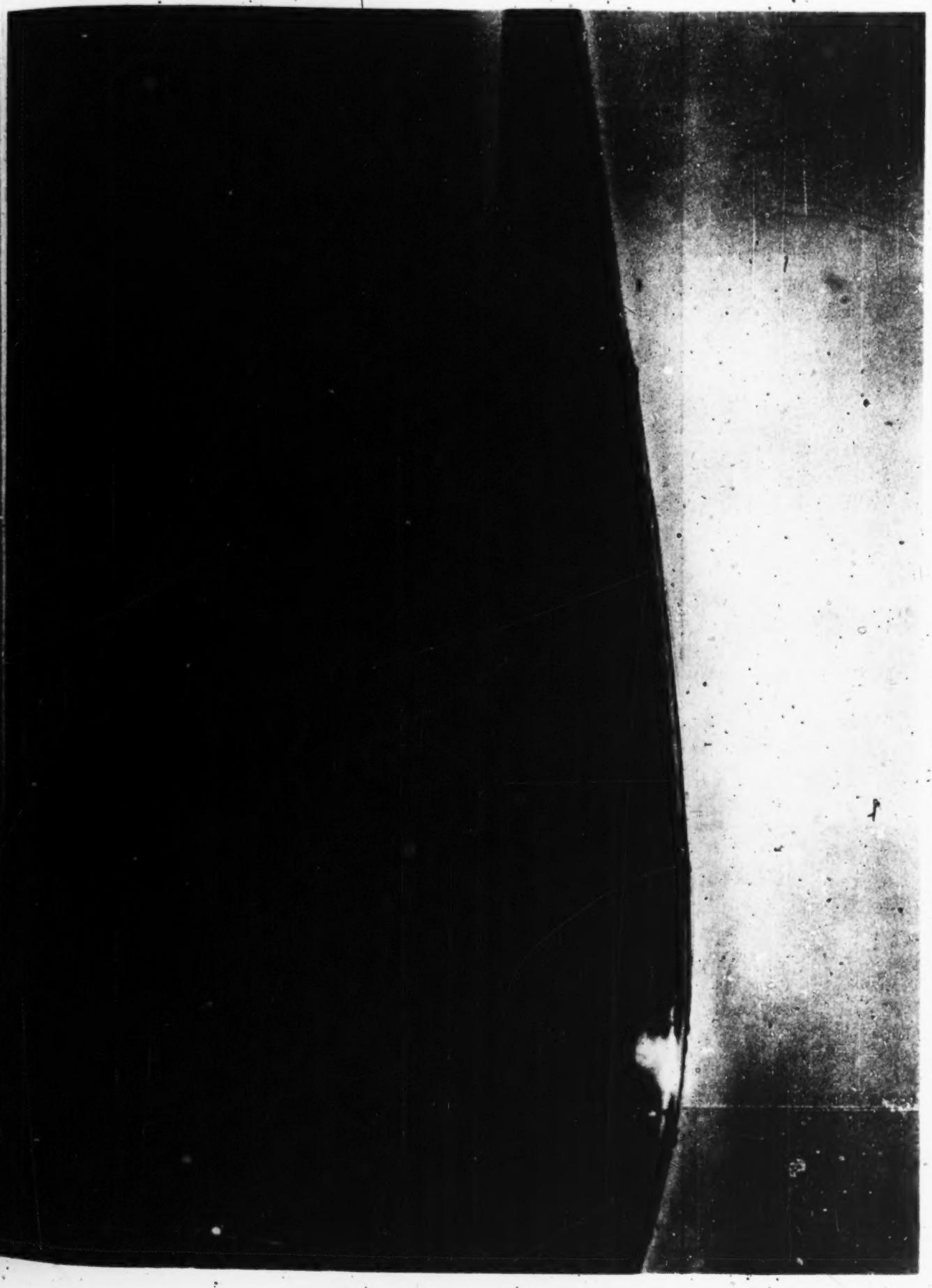
PLAINTIFF'S EXHIBIT NO. 24

PLAINTIFF'S EXHIBIT NO. 25

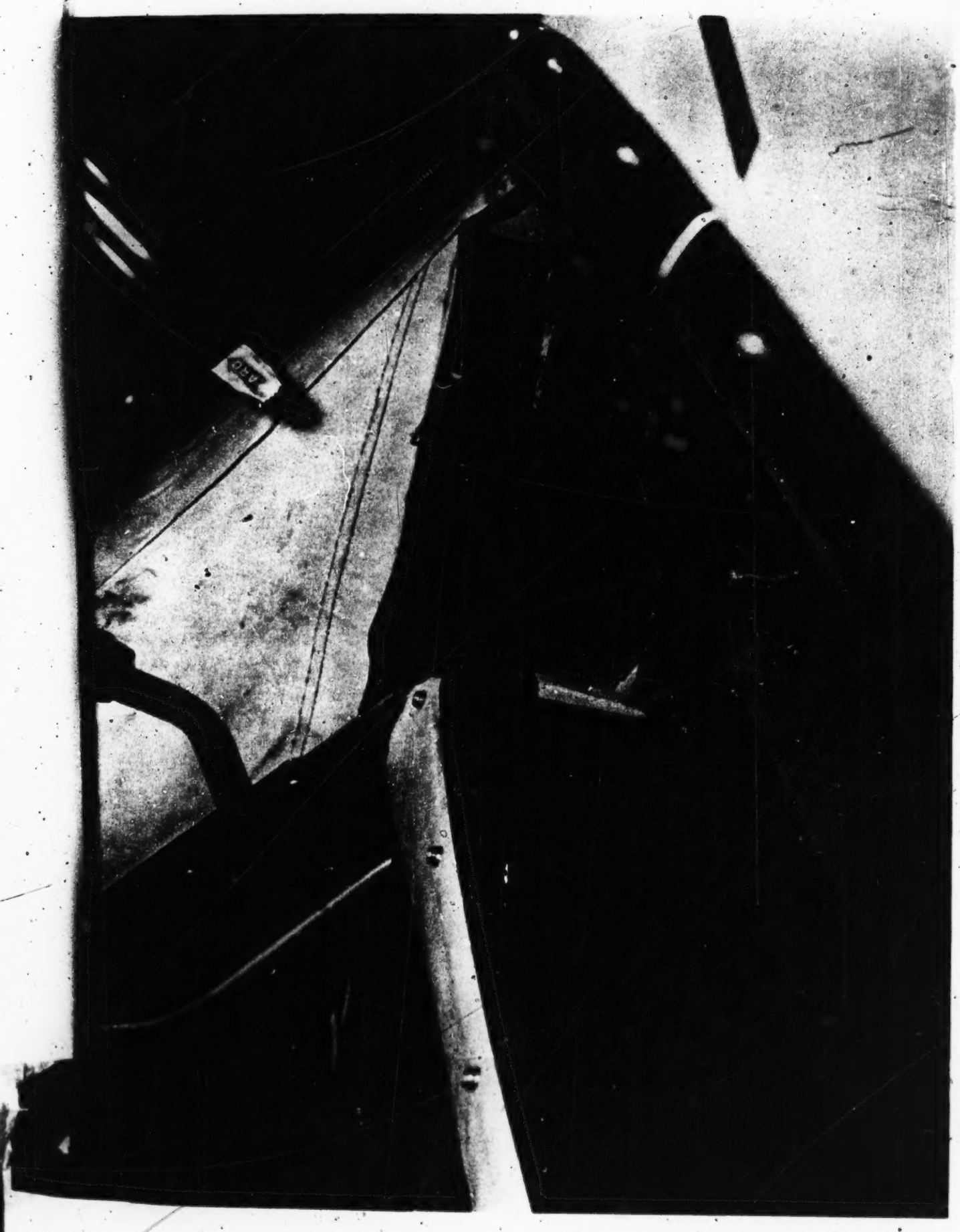




DEFENDANTS' EXHIBIT H



DEFENDANTS' EXHIBIT I



DEFENDANTS' EXHIBIT C'
ASSIGNMENT OF PATENT

Whereas, General Motors Corporation of Detroit, Michigan, a corporation of Delaware, is the owner of the entire right, title and interest in and to United States Letters Patent No. 2,569,724, entitled Convertible Folding Top with Automatic Seal At Rear Quarter, issued in the names of Harry A. Mackie and Stanley Duluk on October 2, 1951.

And Whereas, Automobile Body Research Corp. of Ruxton, Maryland, a corporation of Maryland, is desirous of acquiring an interest in the same.

Now, Therefore, in consideration of One Dollar ($1.00) and other good and valuable consideration paid by said Automobile Body Research Corp. to said General Motors Corporation, receipt of which is hereby acknowledged, General Motors Corporation reserving unto itself, its subsidiaries, foreign and domestic, present and future, and its and their successor or successors, a royalty-free, paid-up, non-exclusive and non-transferable license to make, have made for it or them, use and sell devices embodying the invention of said patent to the full end of the term thereof, hereby sells, assigns and transfers unto said Automobile Body Research Corp. the entire right, title and interest in and to said Letters Patent for the full term (and any extensions thereof) of said Letters Patent; the same to be held and enjoyed by the said Automobile Body Research Corp. as fully and entirely as the same would have been held by General Motors Corporation had this assignment or sale not been made.

In Testimony Whereof, General Motors Corporation has caused this assignment to be executed, sealed and delivered this 30th day of December, 1953.

GENERAL MOTORS CORPORATION
By (s) CHARLES A. CHAYNE
Vice President

Attest:
J. C. DAVIDSON

DEFENDANTS' EXHIBIT DD

Exhibi. No. 25

AGREEMENT

This agreement made this 21st day of July 1955, by and between Automobile Body Research Corp. (hereinafter referred to as AB) of Baltimore, Maryland, a corporation of Maryland; and Ford Motor Company (hereinafter referred to as Ford) of Dearborn, Michigan, a corporation of Delaware.

WHEREAS, AB is the owner of United States Letters Patent 2,549,153, together with all rights to recover for past infringement thereof, this ownership arising by virtue of an assignment to AB from John W. J. Ackermans, which assignment is recorded in the United States Patent Office at Liber Z235 Page 213, and by virtue of an "Agreement" dated December 1, 1953, a photostatic copy of which is attached hereto;

WHEREAS, AB is the owner of the entire right, title and interest in United States Letters Patent 2,569,724 to Mackie and Duluk, together with all rights for past infringement thereof which have accrued since December 30, 1953, by virtue of an assignment from General Motors Corporation to AB which has been recorded in the United States Patent Office on March 8, 1955. Reel 023, Frame 378;

WHEREAS, AB has charged Ford with infringement of said two patents and the parties desire to settle this charge of infringement;

WHEREAS, Ford desires a license to enable it to sell replacement top fabrics under the aforesaid patents,

NOW, THEREFORE, the parties hereto agree as follows:

1. AB hereby releases Ford, its associated companies, domestic and foreign, present and future, its and their successor or successors, its and their dealers, customers and users of its and their products, of all claims that AB has or may have against it or them for infringement

of said patents arising out of the manufacture, use or sale of devices disclosed therein and manufactured before December 31, 1955, other than the "replacement top fabrics" licensed under paragraph 3.

2. Ford hereby agrees to pay AB the total sum of Seventy-three Thousand Dollars ($73,000.00) for the release set forth in paragraph 1, payable as follows: The sum of Thirty-five Thousand Dollars ($35,000.00) is to be paid within fifteen (15) days following the execution of this agreement, and the sum of Six Thousand Three Hundred Thirty-three Dollars and Thirty-three Cents ($6,333.33) to be paid on or before February 15th of each of the six (6) calendar years 1956 through 1961, both inclusive.

3. AB licenses Ford, its associated companies, domestic and foreign, present and future, its and their successor or successors, under said patents, to make or have made for them in the United States and to use or sell throughout the world replacement top fabrics herein called "replacement top fabrics." A "replacement top fabric" as used in this agreement includes only those replacement fabrics which, if sold without the patent owner's consent, would constitute contributory infringement of one or more of said two patents, under 35 United States Code, § 271 (1952). Ford agrees to pay AB a royalty of five per cent (5%) of the dealer net price less any discounts of any and all "replacement top fabrics" hereafter sold by Ford and to make a report to AB by February 15th of each calendar year showing the Ford part numbers of such replacement top fabrics sold by Ford during the preceding calendar year, the dealer net prices less any discounts at which said top fabrics were sold, the number sold at each price, and the royalties due thereon. Ford will accompany the report with a check for the royalties due at the end of the preceding calendar year. If the

Court of Appeals for the Fourth Circuit or the United States Supreme Court holds invalid any of the claims of said Ackermans patent or of any claims of any reissue or extension thereof, or if any court holds any of the claims of said Mackie-Duluk patent invalid, then Ford's obligation to pay royalties under any such invalid claims shall cease as soon as the holding becomes final in the sense that no further appeal or review is possible; provided, however, that if the holding applies only to certain claims of the patent, Ford is not thereby released from payment of royalties on account of its continued operation under a substantially different claim which was not held invalid. The license granted in this paragraph and the obligation to pay royalties provided for herein shall start with the execution of this agreement and continue for the lives of the patents involved. By accepting this license Ford does not admit the validity of the claims of these patents except to the extent of the license granted.

4. Ford agrees to place adequate patent marking of Ackermans patent No. 2,549,153 on those replacement tops licensed under this agreement and manufactured after the date hereof.

5. AB reserves the right to license under said Ackermans patent No. 2,549,153 and said Mackie-Duluk patent No. 2,569,724 the manufacture, use and sale of replacement top fabrics other than those supplied to, made by or sold by Ford, its associated companies, domestic and foreign, present and future, its and their successor or successors, to the extent that AB is entitled to reserve such right under 35 United States Code, § 271 (1952).

6. This agreement is not assignable by either party hereto except as provided hereinabove.

7. The following shall be considered the post office addresses for communications between the parties, but each

party reserves the right to notify the other of a change of address.

Automobile Body Research Corp.
806 Mercantile Trust Building
Baltimore 2, Maryland
Office of the General Counsel
Ford Motor Company
3000 Schaefer Road
Dearborn, Michigan

In testimony whereof the parties hereto have signed and sealed this agreement on the dates set forth below.

July 18, 1955

FORD MOTOR COMPANY
———Signature illegible
Vice President

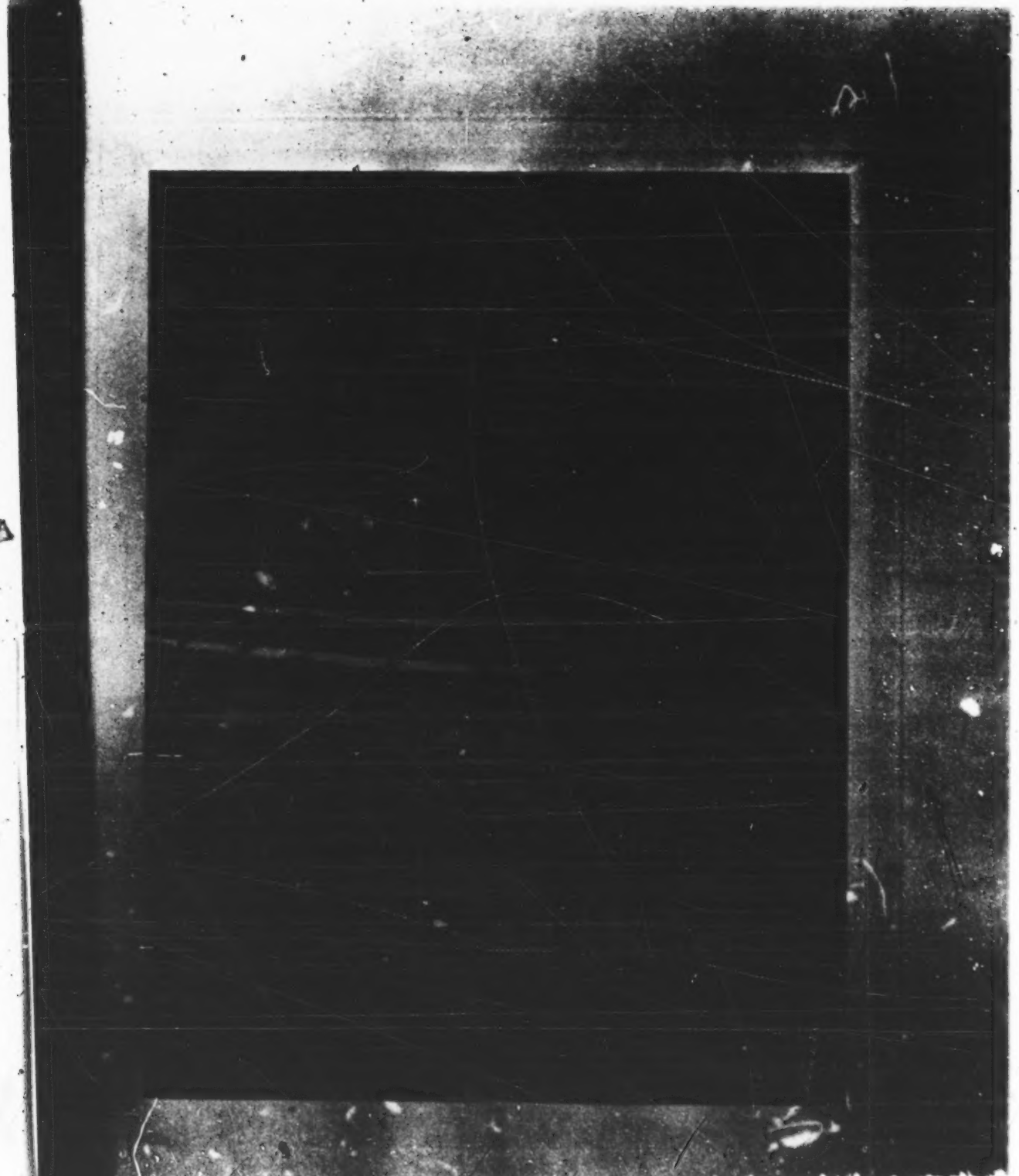
[SEAL]
Attest:
(s) C. J. TELLRATH
Secretary

July 21, 1955

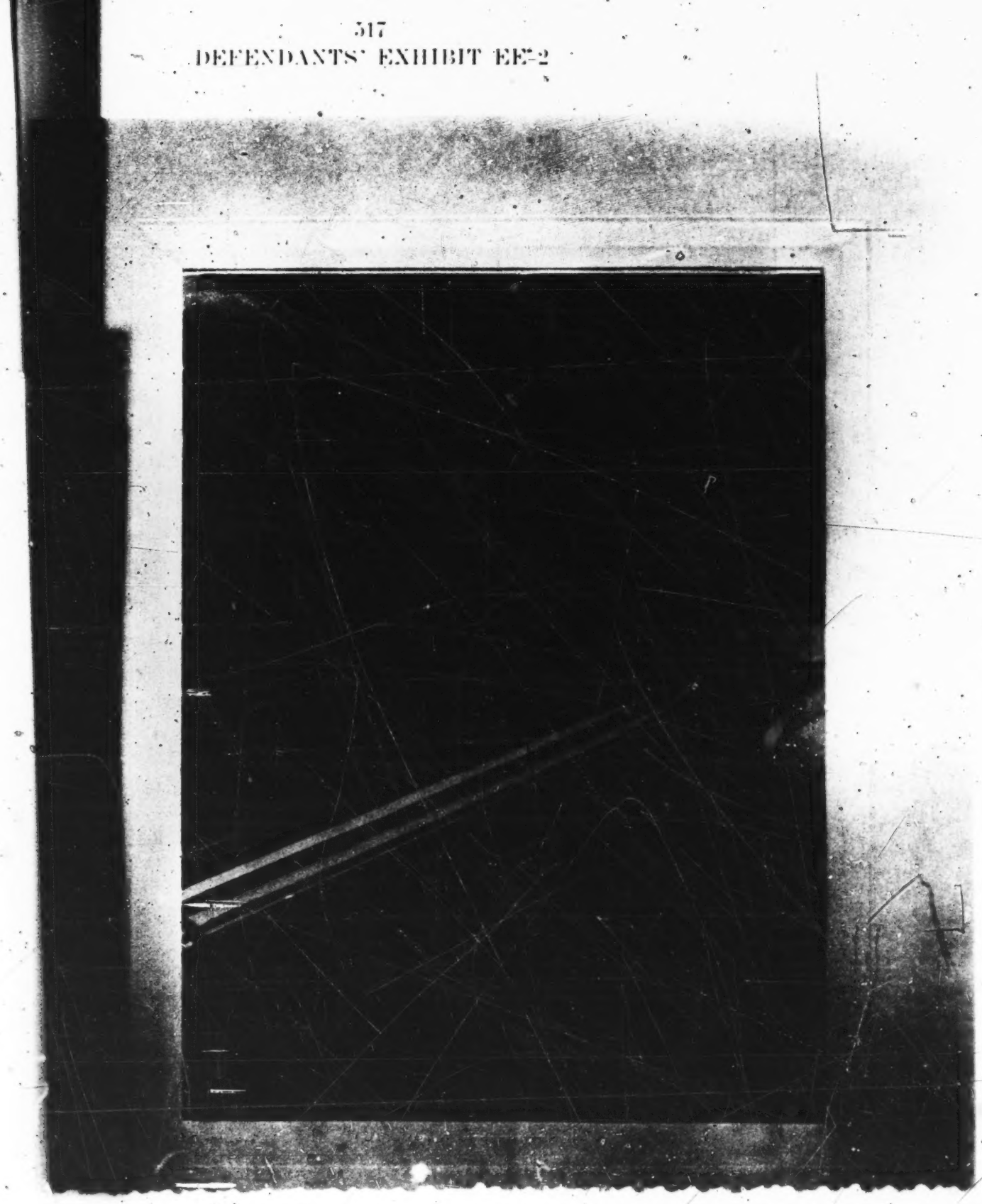
AUTOMOBILE BODY RESEARCH CORP.
By: (s) JOHN L. WHARTON
President

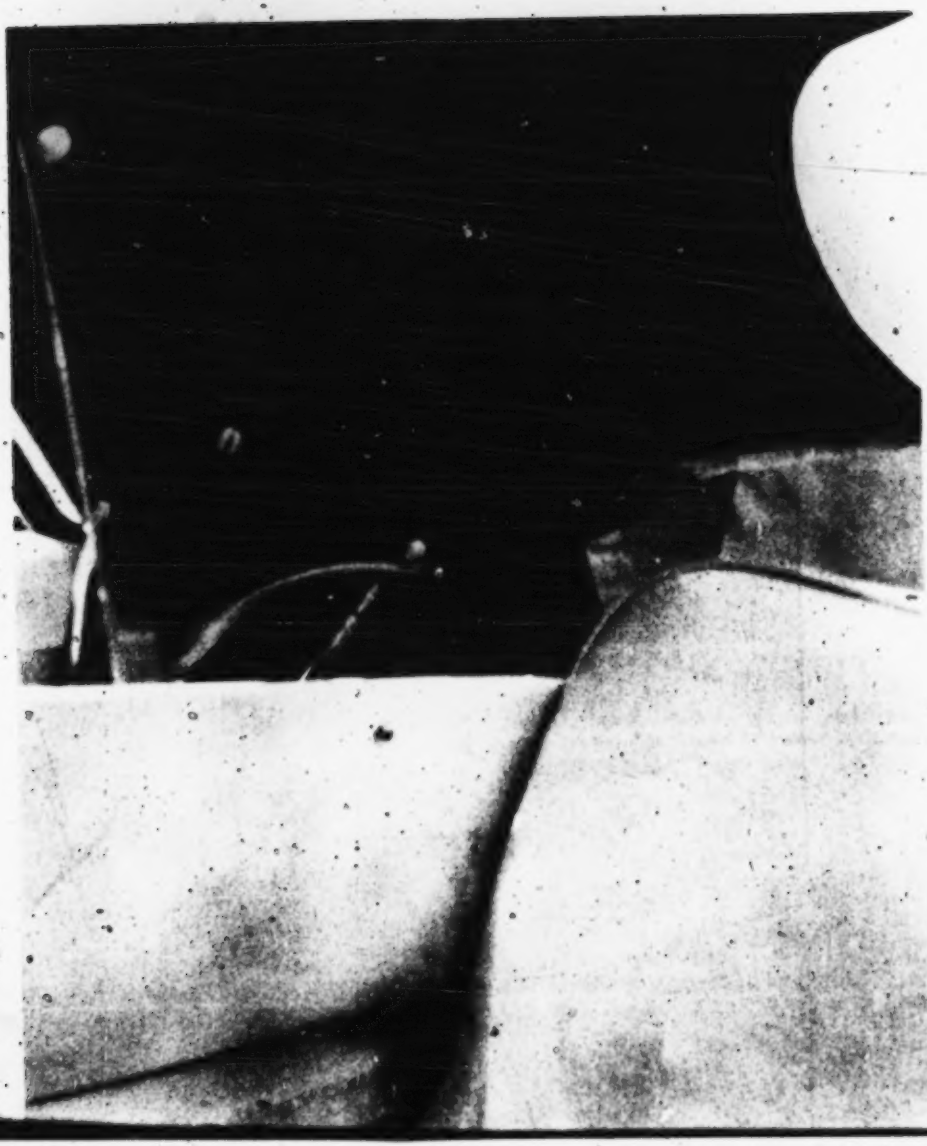
[SEAL]
Attest:
(s) WILLIAM B. KINTER
Secretary

DEFENDANTS' EXHIBIT EE-1



DEFENDANTS' EXHIBIT EE-2





539

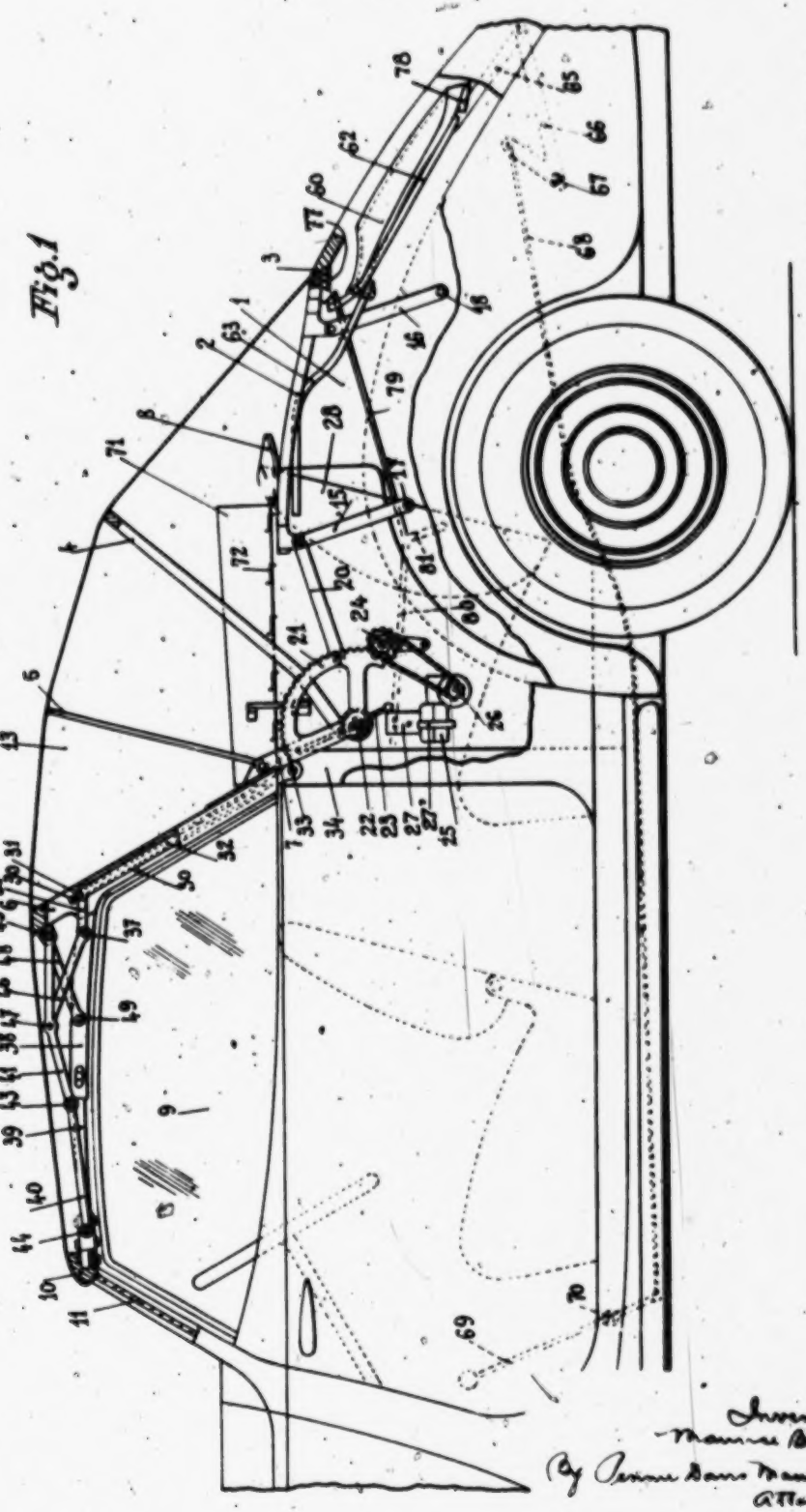
DEFENDANTS' EXHIBIT GG

Jan. 2, 1940. M. BESSONNEAU 2,185,581

DISAPPEARING HOOD FOR MOTOR VEHICLES

Filed Oct. 26, 1935 3 Sheets-Sheet 1

Fig. 1



Inventor
Maurice Bessonneau
By Pennie Davis Marvin & Edmonds
Attorneys

Jan. 2, 1940. M. BESSONNEAU 2,185,581

DISAPPEARING HOOD FOR MOTOR VEHICLES

Filed Oct. 26, 1935 3 Sheets-Sheet 2

Fig. 2

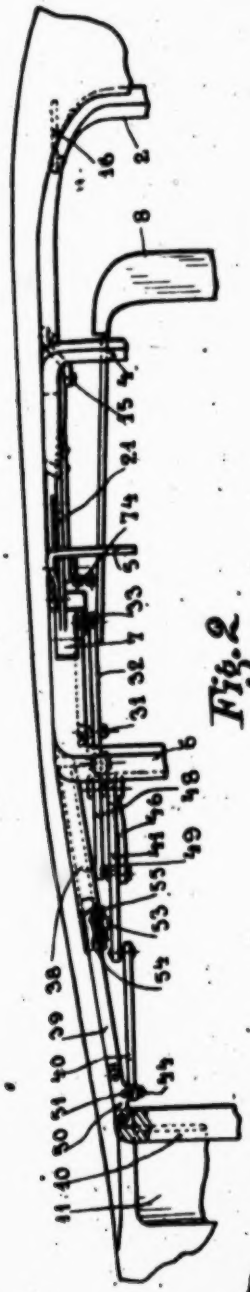


Fig. 7

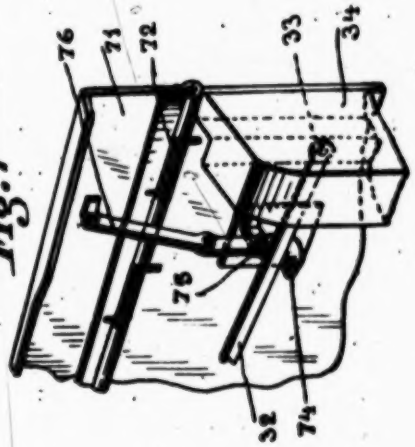
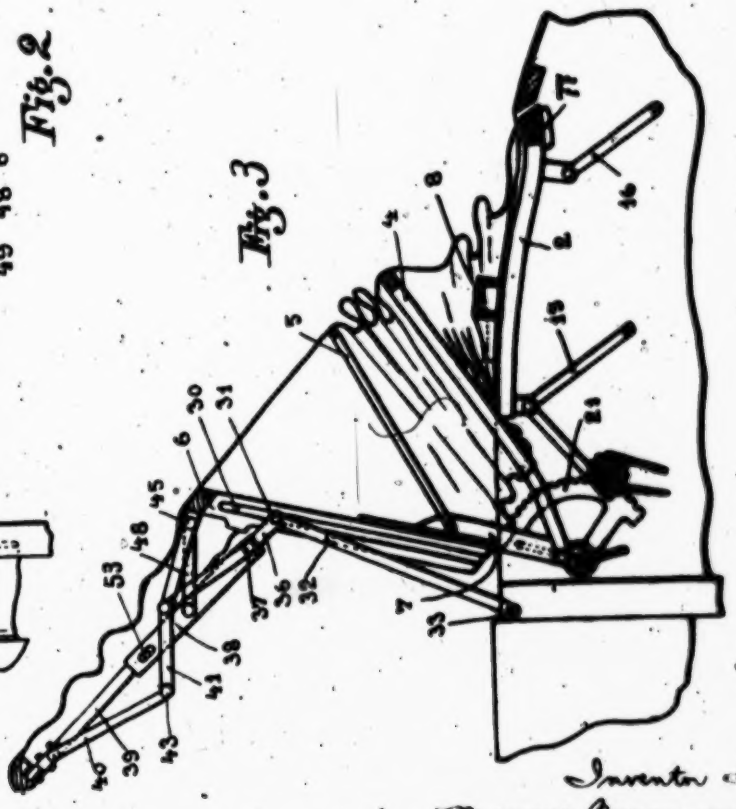


Fig. 3



Inventor
Maurice Bessonneau
By Pennie Davis Marvin & Edmonds
Attorneys

Jan. 2, 1940. M. BESSONNEAU 2,185,581

DISAPPEARING HOOD FOR MOTOR VEHICLES

Filed Oct. 26, 1935 3 Sheets-Sheet 3

Fig. 4

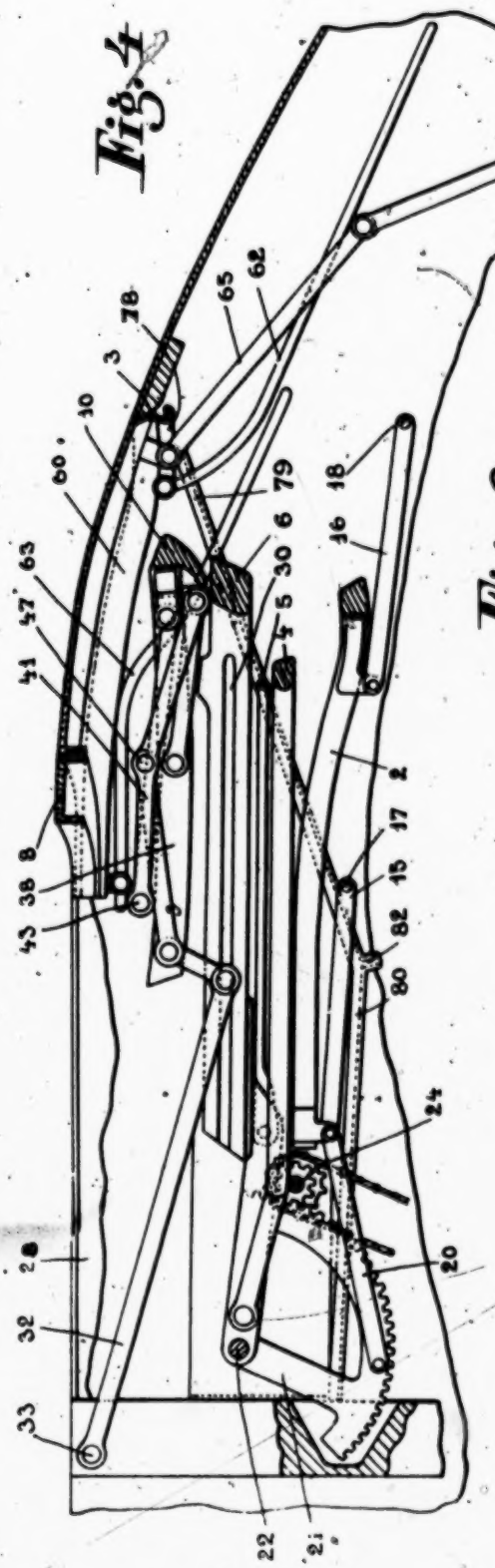


Fig. 6

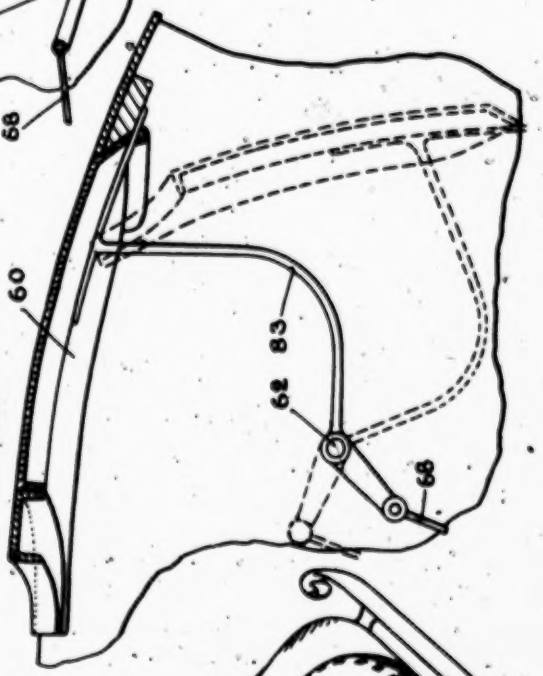
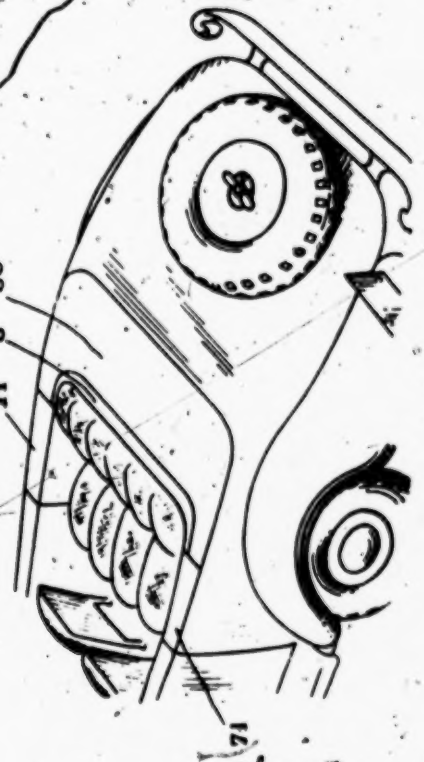


Fig. 5



Inventor
Maurice Bessonneau
By Pennie, Davis, Marvin & Edmonds
Attorneys

anism which is situated on one side of the vehicle, it being understood that the mechanism situated on the other side is symmetrical.

The hoop 2 is mounted so that it will remain practically horizontal as it forms one side of a parallelogram whose other two sides consist of the links 15 and 16 which are pivotally mounted on horizontal axles 17 and 18, located practically in the same horizontal plane. The said hoop is connected by a link 20 to a sector 21 rotatable about an axle 22, and it participates in the rotation of said sector.

The sector 21 is subjected to the action of a spiral spring 23 which tends to turn it in the direction of the opening of the vehicle body top, and its outer perimeter is in gear engagement with a pinion 24 which is rotated by an electric motor 25 through the medium of reduction gear combined with a friction coupling 26 which limits the torque.

The whole of this mechanism is mounted on a metal plate 28 and may be assembled before the carriage body is constructed, and may be delivered separately, the motor 25 being secured to a member 27 supporting said plate by a collar 27'.

A slot 30 located practically according to a straight line passing through the axis of the axle 22 is provided in the hoop 6 and serves as a guide for an axle 31 to which is pivoted a link 32, this latter being pivoted to an axle 33 which is different from the shaft 22, and is mounted for instance on the upright 34 of the carriage body.

A small link 36, which participates in the rotation of the said link 32, is pivoted on an axle 37 mounted on a tubular member 38, in which a bar 39 is slidable. The telescoping movement of bar 39 is controlled by two links 40 and 41 which are pivoted together at 43; one link, 40, is pivoted on an axle 44 mounted on the end of the bar 39; the other link, 41, is pivoted on an axle 45 mounted on the hoop 6. A rod 46 is pivoted at an intermediate point 47 of the link 41 and upon the axle 37; a second rod 48 is pivoted at 49 and also at a point 49 of tubular member 38.

As shown in Fig. 2, the tip 10 is mounted on the bar 39 by means of a double-pivoted member 50, to which is pivoted the rod 49. This latter pivoting can be effected for instance by means of two brackets engaged one within the other and pivoted on a common vertical axle 51, one bracket being pivoted with a socket 44 on which is pivotally mounted the rod 40, held by a nut. On the other hand, a stop is provided on the tube 38 in order to limit the outward move-

telescoping bar 39 is controlled by a link 40, by means of the sliding of the pivot axle 31 in the groove 30, effected by the movement of rotation of the hoop 6.

When opening out the hood device, the link 40 will continue to move forward after stopping of bar 39 by the abutment 55 and the member 50 will be pivoted outwardly, and hence the tip 10 will be brought forward into its definite position. In this manner, the hood will correspond exactly to the trapezoidal form of the vehicle, and the tip will offer no resistance to the inward and outward movements of the telescoping bar 39.

In order to obtain synchronism for the movements on the respective sides of the hood, the motors 25 (one being mounted on each side) are preferably motors of the series type; these are connected in series and are controlled by a reversing switch mounted on the front board. The proper adjustment of the devices 26 for limiting the torque will permit to obtain the movements of the hood without any risk of jamming.

The construction comprises, in order to close the box part 1 between edges 3 and 8 into which the hood is made to disappear, a movable flap or cover 60 corresponding to the form of the carriage body, as shown in Fig. 5. Its ends are movable upon rods which form guides, 62 and 63 (Fig. 1). The said flap is controlled by a link and a V-shaped lever 66, pivoted at 67 to the carriage body. One branch of said lever is connected by a rod 68 to a controlling lever 69 which is pivoted at 70 to the driver's place.

By means of this lever, the driver, before he operates the hood or after the disappearing of said hood, brings the cover 60 from the open position as represented into the closed position (Figs. 4 and 5) and inversely.

On the other hand, the construction comprises, in order to close the lateral openings through which the arrangement of links and uprights for the hoops is caused to disappear, suitable metallic flaps 71 pivoted on hinges provided with torsion springs tending to maintain the said flaps constantly in the raised position (Figs. 1 and 7).

When the hood is to be folded, the whole device is so arranged that the link 32 engages a hook 74 pivoted at 75 and connected by a rod 76 to the flap 71, so that the said flap will be brought down, thus taking the position shown in Fig. 5. It is thus given to the vehicle the perfect outline of a torpedo.

Inversely, when the hood is to be unfolded, the link 32 which is the first to be raised will release the hook 74 and the flap 71 will open by the ac-

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UNITED STATES PATENT OFFICE

2,185,581

DISAPPEARING HOOD FOR MOTOR VEHICLES

Maurice Bonnemaison, Puteaux, France

Application October 26, 1935, Serial No. 46,845
In France October 27, 1934

10 Claims. (Cl. 296—136)

The present invention relates to a disappearing hood for motor vehicles adapted to travel on land or water, or in air, and it has for its object a hood combined with a carriage body in such manner that it will entirely disappear within the said body, thus transforming an inside driving vehicle into a torpedo having a most approved form.

Another object of the invention consists in the combination of a preferably mechanically controlled hood with a carriage body provided with flaps or the like which completely and automatically cover the opening of the recess in the carriage body adapted to receive the hood when folded down.

Another object of the invention consists in a simple and practical arrangement permitting to effect all the controls required to transform a torpedo into an inside driving car, and inversely, from the driver's seat and without making it necessary to stop the vehicle.

In a preferred form of construction, the framework of hood comprises a tilt hoop to which is secured the rear end of a piece of waterproof canvas and which is located within said recess in the carriage body, said hoop being so arranged as to bear upon the edge of the said recess when in the operative position and to descend into the interior of said recess when the hood is folded down.

The opening of the recess in the carriage body in which the hood is stowed in the folded state is thus quite free and the said carriage body preferably comprises one or more panels, pivoting or slidable, which has been moved aside when the hood was opened out, and which now serve to close the said opening automatically or not—such opening being no longer apparent—without risk of damaging the canvas when the hood is folded down.

The above mentioned hoop is preferably arranged in such manner that it will move in the interior of the said recess while remaining parallel to itself, in order to facilitate the folding of the canvas.

[illegible]

is pushed in concurrently with the pivoting of said support due to the sliding in a guide secured to the said support of a portion of a rod which is pivoted to the carriage work on a different axis from that of the said shaft.

The whole device is so arranged that it is adapted for use with all the known types of carriage body which become narrow towards the front of the vehicle, and it may be operated for instance by a single electric motor or by a motor mounted on each side of the vehicle.

Further objects, features and advantages will be set forth in the following description with reference to the annexed drawings which are given solely by way of example and in which:

Fig. 1 is an elevational view, with parts broken away, of a carriage body of a motor vehicle provided with a hood in conformity with the invention.

Fig. 2 is a corresponding plan view with the waterproof canvas removed.

Fig. 3 is a partial view analogous to Fig. 1 showing the hood in an intermediate position during the folding operation.

Fig. 4 is a partial view analogous to Fig. 1 showing the hood entirely folded.

Fig. 5 is a perspective view of a carriage body with the hood in the folded position.

Fig. 6 is a partial view analogous to Fig. 4 of a modification.

Fig. 7 is a detail view on a larger scale, the outside wall of the body being removed.

In the form of construction shown in Figs. 1 to 5, a recess 1 whose outlet orifice on the top part of the carriage body has a U shape is formed at the rear of the body of a motor vehicle, and the two branches of this U extending along the two lateral edges of the said body.

The framework of the hood comprises a first tilt hoop 2 which, in the operative position (Fig. 1), bears upon the rear edge 3 of the recess 1 with which it makes a joint, and also three other divergent hoops 4, 5 and 6, whereof the first two, 4 and 5, are pivoted to the lower end 7 of the last hoop 6.

While I have described what I at present consider preferred embodiments of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from my invention and I, therefore, aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim is:

1. A device for covering a recess provided at the rear end of the body of a vehicle and adapted to contain a folded hood, said recess having a substantially U shaped opening, said device including a transverse panel, means for mounting said panel for movement to occupy a working position in which it covers the part of said opening corresponding substantially to the middle part of said U, and a rest position in which said part is discovered, at least two rigid flaps, means for mounting said flaps for pivotal movement substantially about edges of said opening corresponding to the respective branches of said U to occupy a position covering the parts of said recess corresponding substantially to the branches of said U and a second position in which said flaps are disposed substantially vertically, and operating means for said flaps.

2. A device as claimed in claim 1 in which said operating means are controlled by said hood.

3. A device as claimed in claim 1 wherein said hood includes at least one lever on each side pivoted within said recess, a projecting piece, connected to each of said flaps and adapted to come into contact with said lever at the end of the folding motion of the hood, thus closing said flap, resilient means designed to return said flap to its second position when said piece is released.

4. A device for covering a recess provided at the rear end of the body of a vehicle and adapted to contain a folded hood, including on each side a support pivoted to said body within said recess and a member pivoted within said recess at a point spaced from the pivot point of said support, said recess having a substantially U shaped opening, said device including a transverse panel supported within said recess, means for mounting said panel for movement to occupy a working position in which it substantially covers the part of said opening corresponding to the middle portion of said U and a rest position in which said part is discovered, at least one rigid side flap pivoted on each side of said body, a projecting piece connected to each flap and arranged to come into contact with said member adapted to close said flap, and resilient means designed to open said flap.

5. A device as claimed in claim 4 wherein said flaps are pivoted about the inner edge of said opening, whereby they are invisible from the outside of the body when they are in their second position, the hood being unfolded.

6. In a vehicle body the rear part of which is provided with a recess adapted to contain a folded hood, and having a U shaped opening, means for covering said opening including at least two rigid flaps, means mounting each of said flaps for pivotal movement about edges of said opening corresponding to the respective branches of said U to occupy a position covering a part of said recess and a second position in which said part is uncovered, the flaps being in said second position disposed substantially vertically, and operating means for said flaps controlled by said hood.

7. A vehicle body as claimed in claim 6 wherein each of said flaps is hinged to the inner side of said opening.

8. In a vehicle body the rear part of which is provided with a recess having a substantially U shaped opening in the top part of said body, said top part including a curved portion at the rear of said opening, said recess being adapted to contain a folded hood the rear end of the covering piece of which is placed within said recess substantially below said opening when the hood is folded whereby a space is provided within said recess between said curved portion and the folded hood, a transverse panel adapted to cover at least the portion of said opening corresponding to the middle part of said U, the outer surface of said panel being curved to merge in the closed position into the surface of said top portion, means for mounting said transverse panel for movement through said space to occupy a second position in which it is wholly disposed within said recess and below said curved portion.

9. A vehicle body as claimed in claim 8 including a fixed and horizontal pivot axis within said recess, at least one supporting member rigid with said transverse panel and mounted for rotation about said axis to occupy two positions corresponding respectively to the two positions of said panel, the surface of said supporting member directed in the forward direction being of concave form whereby said member is adapted to be displaced between its two positions without interfering with said folded hood.

10. A vehicle body as claimed in claim 8 including guiding means within said recess extending below said opening, below said curved portion and through said space, said panel being slidingly supported by said guiding means between its working and second position.

MAURICE BESSONNEAU.

May 9, 1939. M. BESSONNEAU 2,157,783

FOLDING HOOD FOR AUTOMOBILE VEHICLES OR THE LIKE

Filed Nov. 16, 1938 3 Sheets-Sheet 1

Fig.1

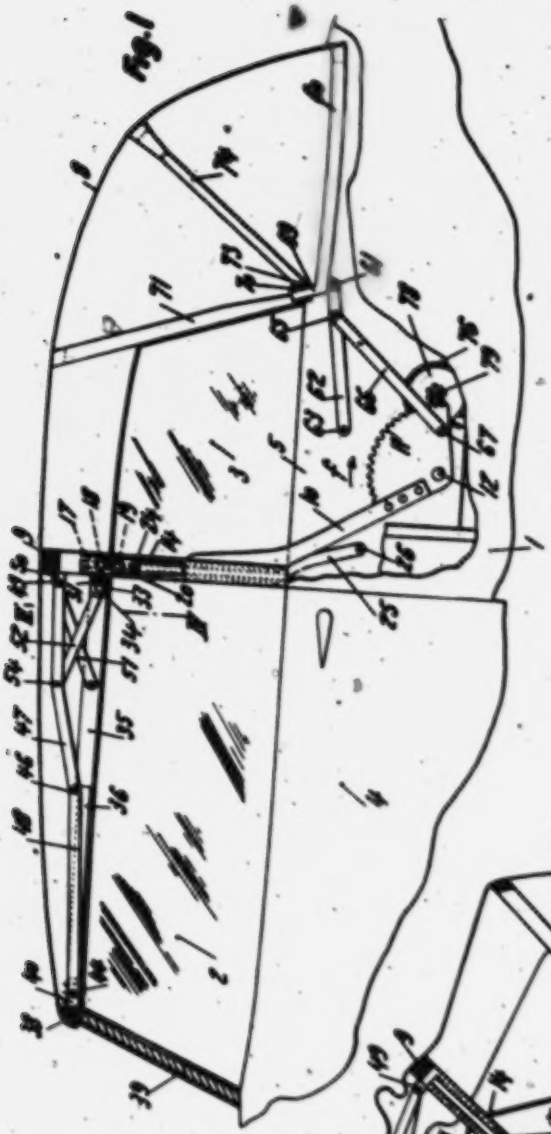


Fig.3

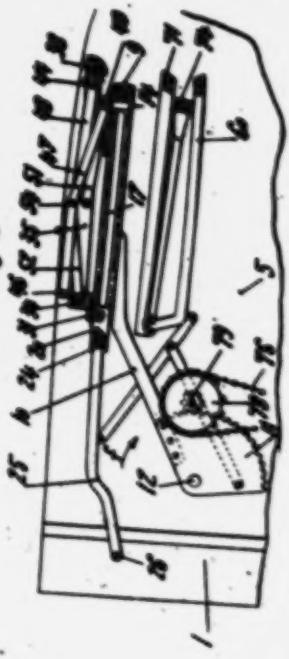
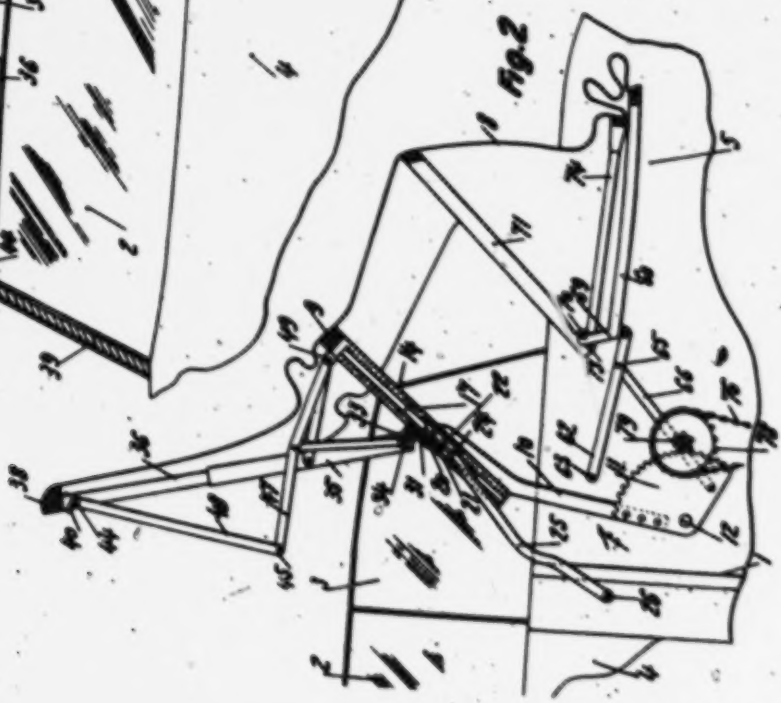


Fig.2



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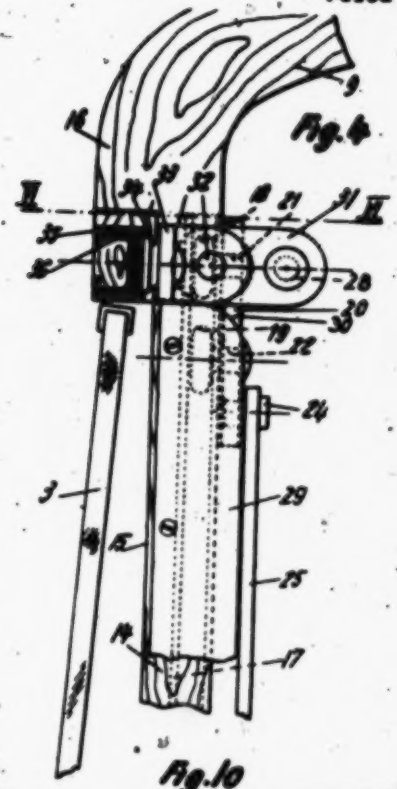
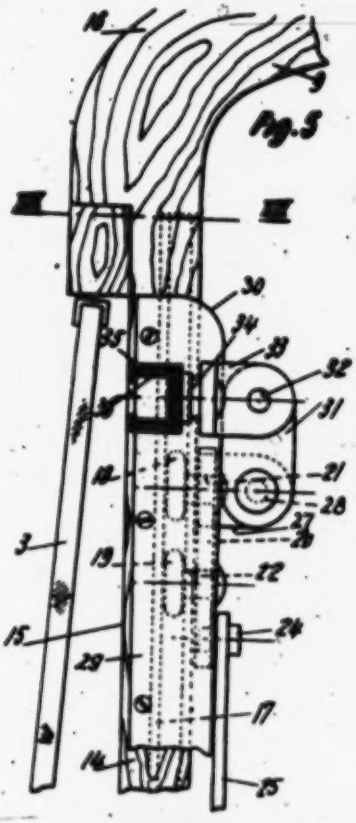
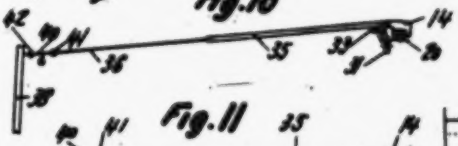
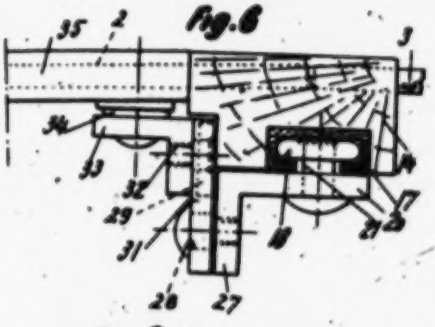
FOLDING HOOD FOR AUTOMOBILE VEHICLES OR THE LIKE

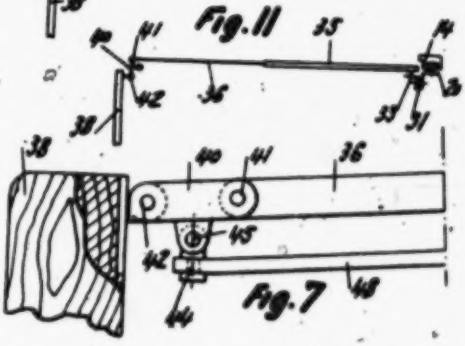
Filed Nov. 16, 1938 3 Sheets-Sheet 2

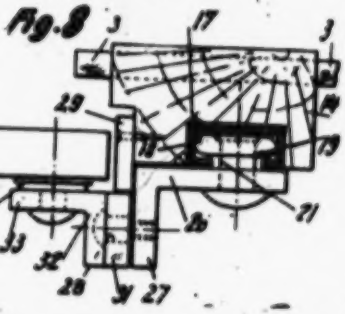


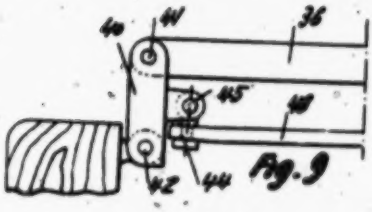












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FOLDING HOOD FOR AUTOMOBILE VEHICLES OR THE LIKE

Filed Nov. 16, 1938 3 Sheets-Sheet 3

Fig. 12

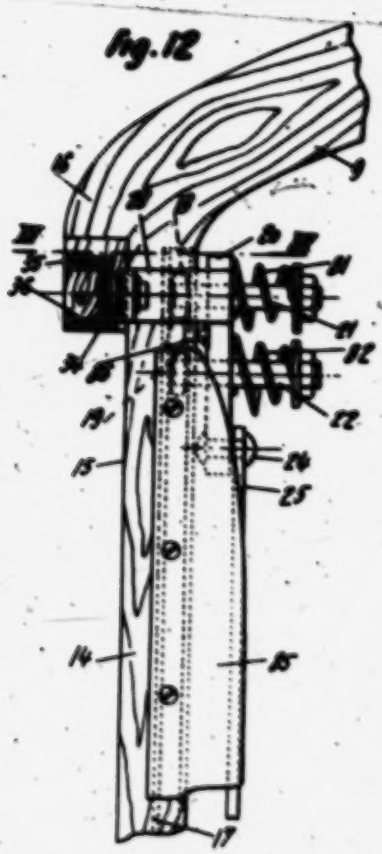


Fig. 13

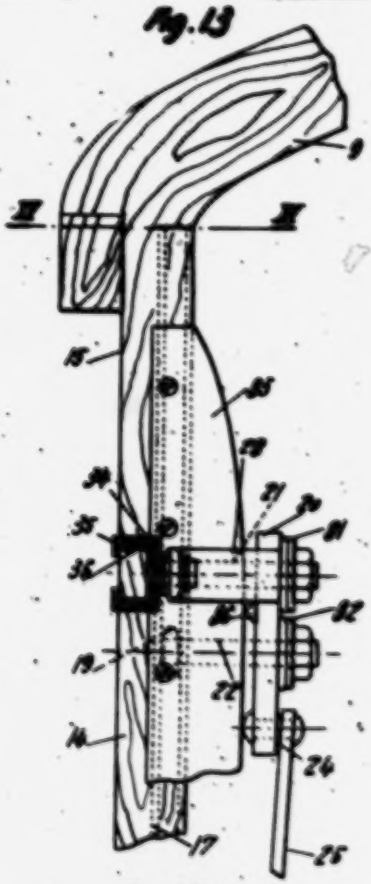


Fig. 14

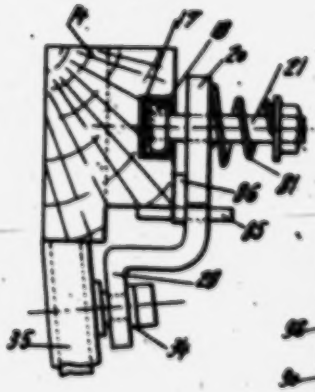
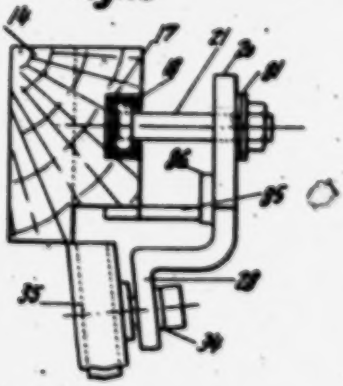


Fig. 16

Fig. 15



Patented May 9, 1939 2,157,783

UNITED STATES PATENT OFFICE

2,157,783

FOLDING HOOD FOR AUTOMOBILE VEHICLES OR THE LIKE

Maurice Boscoumeau, Puteaux, France

Application November 16, 1938, Serial No. 240,846
In France November 20, 1937

14 Claims. (Cl. 296—116)

My invention relates to an automatic folding hood for automobile vehicles or the like and adapted to convert the latter at will into an open car or into a saloon car, and it relates more particularly to the folding hoods of the type described in my co-pending application Serial No. 46,845.

The automatic folding hoods at present in use have no intermediate support between the wind-screen which forms the front end and the front hoop of the rear frame of the hood on the perimeter of which is fixed the cloth or the like. Owing to this fact, the space between said hoop and the wind-screen, and which is occupied by a window, has a limited length so that in general the rear seats of vehicles with hoods only offer their occupants a reduced lateral visibility owing to the fact that it is impossible to arrange windows corresponding to such seats and terminating towards the rear of the car as near the back of the rear seats as would be desirable.

On the other hand, the nevertheless relatively great length of certain vehicles having comfortable rear seats between the said front hoop and the wind-screen would make it necessary to construct a complicated, heavy and cumbersome front frame which would frequently quickly become noisy.

The primary object of my invention is the construction of a hood for an automobile vehicle of which the body is provided with windows, said hood offering a satisfactory visibility from the rear seats and not having the drawbacks referred to above.

The hood according to my invention comprises on the one hand a rear frame formed by hoops and which includes a front supporting hoop hinged on the body, and, on the other hand, a front frame carried by said supporting hoop and essentially formed on either side of the body by a longitudinal bar having telescopic elements position, and on the other hand the front edge of the cloth forming the rear portion of the hood is secured to a hoop hinged at the rear of said supporting hoop.

This arrangement enables mechanically actuated disappearing hoods to be constructed for bodies having four windows each arm of the hoop being substantially located between the two windows in the open position and advantageously arranged entirely on the inside of the body relatively to said windows of which the frames or the like completely conceal it.

According to an important feature of my invention, the longitudinal telescopic bar is carried by the supporting hoop in such a manner that, when in the position of use, said bar is above the windows and substantially in contact with same so that the cloth covering overlaps the windows when it is unfolded as known and is automatically moved towards the inside of the vehicle at the beginning of the folding movement in order to enable said movement to take place when the windows are in the lifted position without said bar coming into contact with same.

This feature is more particularly applicable to hoods in which the said telescopic bar is mounted so that it can pivot about an axis, which is transverse relatively to the vehicle, on a hinge bracket carried by the supporting hoop through the intermediary of a carriage sliding in a guide-way provided in each of its arms, responsive to an appropriate control which is preferably formed by a lever pivoted on the one hand on said carriage, and on the other hand at a point of the body which is different from the hinge point of said hoop, and consequently reference will be made in the specification solely to hoods of this type.

One embodiment of my invention is intended more particularly but not exclusively for hoods for bodies of which the front tapers and for

and of which the length corresponds to the necessary movement of said bar perpendicular to the said axis for said bar to be located entirely inside the vehicle relatively to the rear window.

Preferably, said connecting rod engages a guiding cam fixed on the arm of the supporting hoop, said cam being provided with a curved part adapted to positively control the pivoting motion of said connecting rod at least in the direction of displacement of the telescopic bar towards the inside of the vehicle at the beginning of the downward movement of the aforesaid carriage when folding the hood. The pivoting motion of said connecting rod in the other direction takes place automatically under the action of the linkage of the hood, at the end of the unfolding of the latter, in the case in which said intermediate part carrying the nose-piece is provided, and simultaneously with the pivoting of said part.

Another embodiment of my invention consists in fixing the hinge bracket of the telescopic bar on a plate of the carriage adapted when sliding to be moved perpendicular to the longitudinal axis of the vehicle by means of a cam fixed on the arm of the supporting hoop along the guide-way of said carriage and on which a part of said plate is resiliently pressed.

Numerous other embodiments of the control of the lateral displacement of the telescopic bar can moreover be imagined.

Another important feature of my invention relates to the arrangement of the rear frame of the hood which is adapted to be folded automatically responsive to a mechanical control at the same time as the front frame.

According to an embodiment, the rear hoop of the hood on which the rear end of the cloth is fixed is pivoted on either side on a lever which is pivoted on the body and which is suitably inclined to enable said hoop to penetrate into its housing without substantially moving rearwards, said lever moving under the control of another lever pivoted on the former and on the rotary member on which the front supporting hoop is fixed.

Preferably, in order to decrease the overall length of the folded hood, the fixing hoop of the front end of the cloth of the rear end is pivoted on said rear hoop and advantageously carries at the end of an arm projecting from this pivot point, the pivot pin of an intermediate hoop.

Other features and advantages of the invention will moreover become apparent from the ensuing description taken with reference to the accompanying drawings which is given solely by way of example and in which:

Fig. 1 is a partly broken away side view showing the unfolded hood,

Fig. 8 and Fig. 9 are similar views to Figs. 6 and 7 and correspond to Fig. 5, Fig. 8 being a section along the line VIII—VIII of Fig. 5,

Figs. 10 and 11 are diagrammatical views of the arrangement of the parts corresponding respectively to the groups of Figs. 6 and 7, and 8 and 9 respectively,

Figs. 12 and 13 are similar views to Figs. 4 and 5 and show a modification,

Figs. 14 and 15 are corresponding sections along the lines XIV—XIV and XV—XV of Figs. 12 and 13,

Fig. 16 shows a modification of the main supporting hoop.

Reference will be made hereinafter solely to one side of the body and of the hood, the other side being identical.

Referring to Figs. 1 to 11, a hood has been shown for an automatic vehicle body 1 having on each side a front window 2 carried by a door 4 and a rear window 3 intended to ensure visibility for the occupants of the rear seat (not shown), said hood being adapted to be retracted into a housing 5 of U-shaped cross-section surrounding the rear seat.

The hood which is covered with a waterproof fabric 6 has a main supporting hoop 9 fixed by a swan-necked extension 10 on a part 11 mounted on a pivot 12 inside the housing 5.

Said hoop 9 is composed on either side of the vehicle by an arm or upright 14 which, in the position of use (Fig. 1), is vertical and is located between the two windows 2 and 3. The upright 14 has a recess 15 on its outer face (Fig. 4) so that its upper part 16, which is intended to support the cloth 6, slightly overlaps the outer plane of the windows, the height of said recess 15 being sufficient to enable said hoop to rotate about the pivot 12 when the window is in its raised position.

As shown on a larger scale in Figs. 4 and 6 in the recess 15 of the upright 14, which is assumed to be made of wood is lodged a C-shaped metal guide-way, 17 parallel with said upright and in which rolls a group of two rollers 18 and 19 of which the pivots 21 and 22, having their axes transverse relatively to the vehicle, support a plate or carriage 20. The plate or carriage 20 carries below the rollers 18 and 19 a pivot 24 having its axis parallel with the axes of said rollers. A lever 25 is pivoted on the one hand on said pivot 24 and on the other hand, inside the housing 5, on a pivot 26 carried by the body and at some distance from the pivot 12.

The plate 20 is provided with a shoulder 27 carrying a pivot 28 the axis of which is parallel with the longitudinal axis of the vehicle and on which is pivoted a connecting rod 31 of suitable length.

The connecting rod 31 engages a guiding cam 34

[illegible] 34, to which is pivoted the rod 40. This latter pivoting can be effected for instance by means of two brackets engaged one within the other and pivoted on a common vertical axle 51, one bracket being pivoted with a socket 44 on which is pivotally mounted the rod 40, held by a nut. On the other hand, a stop is provided on the tube 38 in order to limit the outward movement of the bar 39 without acting against the entering movement. The said stop may consist of a spring stud 53 which projects and enters a hole 54 formed in the bar 39. The bottom of said hole is inclined from the entrance towards the bottom 55, in such manner that the said stop will gradually move back during the entering movement of the bar 39 which encounters no obstacle, the outward movement being limited by the abutment 56.

It will be noted that it will suffice to turn the sector 21 from left to right in order to fold up the whole arrangement in a manner resembling what is shown in Fig. 3, and this folding commences by bringing down the rear hoop 4. The canvas is unfolded by the rotation of the sector 21 in the opposite direction, the tension of the canvas being maintained by means of the spring 23.

The inward and outward movement of the hook 74 pivoted at 75 and connected by a rod 76 to the flap 71, so that the said flap will be brought down, thus taking the position shown in Fig. 5. It is thus given to the vehicle the perfect outline of a torpedo.

Inversely, when the hood is to be unfolded, the link 32 which is the first to be raised will release the hook 74 and the flap 71 will open by the action of the springs 73 before the rising framework can make contact with the said flap.

The whole device is completed by a spout or gutter 77 mounted on the edge and parallel to the axis of the wheels of the hoop 3; a spout 78 mounted on the edge of the flap 69; and two spouts 79 and 80 situated along each outer wall of the box part 1, which are adapted to collect the water from the aforesaid spouts and lead to each evacuation conduit 81.

Fig. 6 shows a modification of the flap device 69, and instead of being slidable, it is mounted on a support 82 pivoted on an axle 83. A rod 84 to which a cable 85 is attached is rotatable together with the support 82. It will be observed that the flap 69 will pivot automatically and will assume the position shown in the dotted lines, when the cable 85 is released, and that a tension exercised upon this cable will bring the flap into the closed position.

not—such opening being no longer apparent—without risk of damaging the canvas when the hood is folded down.

The above mentioned hoop is preferably arranged in such manner that it will move in the interior of the said recess while remaining parallel to itself, in order to facilitate the folding of the canvas.

The framework of the hood comprises, in addition to the said hoop which is preferably connected with a driving shaft, at least one support which is mounted on the same shaft and carries the front part of the framework, this being so arranged as to fold down when the said support turns about the said shaft and comes with the said hoop in the interior of the recess.

The front framework consists, to advantage, of at least one longitudinal telescoping bar which

[illegible] along the two lateral edges of the said hood.

The framework of the hood comprises a tilt hoop 2 which, in the operative position (Fig. 1), bears upon the rear edge 3 of the recess 1 with which it makes a joint, and three other divergent hoops 4, 5 and 6, whose the first two, 4 and 5, are pivoted to the hood end 7 of the last hoop 6.

This last hoop 6, whose front part forms an upright support for the lateral glass panels, carries the front framework which ends in a cross piece or tip 10 resting upon the top of the wind-shield 11. The covering consisting of waterproof canvas 13 has its extreme ends secured respectively to the tilt hoop 2 and to the tip 10 and it may also be secured at an intermediate point to the hoop 6.

The following description relates to the me[illegible]

an L-shaped hinge-bracket 33. Said hinge bracket 33 carries on its arm which is perpendicular to the one mounted on the pivot 32 a pivot 34 having its axis transverse relatively to the vehicle and on which is mounted the guide portion 35 of a telescopic bar 35—36. Inside this guide bar 35 is mounted a sliding bar 36 the travel of which is limited by a stop. The front end of the sliding bar 36 carries the nose-piece 38 (or transverse front part of the hood intended to rest on top of the wind-screen 39 and on which is fixed the front end of the cloth 8) through the intermediary of a connecting member 40 (Figs. 7 and 9) which is pivoted by means of suitably spaced vertical pivots 41 and 42 on said bar 36 and on the nose-piece 38 respectively.

The front frame of the hood is completed by the hinged control system which is connected with a tail which is terminated by a pivot 44 and hinged by means of a vertical pivot 45 on an extension of the connecting member 40. Said hinged system comprises a group of two levers 47 and 48 which are pivoted on each other by a pivot 46 at one of their ends and of which the other ends are pivoted respectively about axes which are transverse relatively to the vehicle on the tail 44 and on a pivot 49 carried by a lug 50 fixed to the upright 14.

The hinge system as a whole is completed (Fig. 1) by a lever 51 pivoted on the guide-bar 35 and on the upright 14, for example on the pivot 49, and by a lever 52 pivoted on the pivot 34 and on a pivot 54 fixed at an intermediate point of the lever 47.

The rear frame of the hood comprises a hood 60 on which is fixed the rear end of the cloth 8 and is intended to be pressed, in the position of use, against the outer edge of the housing 5 and to penetrate into said housing when the hood is folded.

Said hoop carries a pivot 61 having its axis transverse relatively to the vehicle and on which is pivoted a lever 62 which is itself pivoted by means of a pivot 63 on the body. At an intermediate point of the lever 62 is arranged a pivot pin 66 of a lever 66 which is itself pivoted at its other end on a pivot 67 carried by the actuating quadrant 11.

The end of each arm of the hoop 60 has an upwardly directed extension 68 which carries the hinge pin 70 of an intermediate hoop 71 on which is fixed the end of the cloth 8 forming the rear portion of the hood. Each arm of the hoop

In other words, the assembly located between the upright 14 and the nose-piece occupies the position shown diagrammatically in plan view in Fig. 10 showing the taper of the body towards the front.

When the member 11 is rotated in the direction of the arrow *f*, Fig. 1, said member 11 drives the hoop 9, and the carriage 28 is moved downwards along the guide-way 17 by the lever 25, as shown in Fig. 2. During the first part of this movement, on the one hand the levers 47 and 48 pivot about the pivots 49 and 46, and exert a push on the tail 44 causing the connecting member 40 to swing and take up its transverse position shown in Fig. 9, and on the other hand the intermediate connecting rod 31 engages the curved part 30 of the cam 29 and takes up its vertical position. Owing to this fact, the front end of the bar 35—36 has moved away from the longitudinal axis of the vehicle and its rear end has moved towards said axis, so that the whole arrangement occupies the position shown in Fig. 11 in plan view, in Fig. 2 in elevation, and in Fig. 5 in section, the bar 35—36 being substantially parallel with the longitudinal axis of the vehicle. The rear part of the bar 35 is then moved towards the inside of the body relatively to the windows and, as the nose-piece 38 is raised above the window 2, the sliding of the plate 20 along the upright 14 at the same time as the swinging of the hoop 9 can take place up to the position shown in Fig. 3 without closing the windows, the connecting rod 3 sliding along the rectilinear part of the cam 29.

At the same time, the lever 66 swings the lever 62 moving the hoop 60, on which the two hoops 71, 74 fold, towards the inside of the housing 5, the latter hoop without projecting rearwardly with respect to the two others owing to its being hinged on the pivot 73 carried by the extension of the arm of the hoop 71. The whole arrangement then occupies a very small space in the housing 5, as shown in Fig. 3, and said housing can moreover be closed by means of flaps.

For unfolding, the quadrant 11 is rotated in the opposite direction to the arrow *f*.

When the upright 14 comes into the vicinity of its vertical position, the sliding bar 36 is at the end of its travel within bar 35 which is limited by a stop and the lever 47 pushes the tail 44 and swings the connecting member 40. The lateral displacement of the telescopic bar 35—36 which then takes place positively causes the intermediate connecting rod 31 to swing about the

14 and of a guide cam 85, similar to the cam 29 described in the above embodiment fixed on the upright 14 and on which the plate is adapted to bear through the intermediary of a projecting part 86 fixed on its surface opposite said cam. The shape of the guide surface of said cam 85 is that of a slope which runs away from the outer surface of the upright 14 by a length equal to the aforesaid transverse displacement and continues up to the lower end of the guide-way 17. The longitudinal bar 35 is mounted directly, through the intermediary of a pivot 34 which is substantially transverse to the vehicle, on an extension 28 of the plate 26.

It will immediately be seen that when the lever 25 moves the plate 26 downwards, said plate moves laterally against the action of the springs 81 and 82 under the influence of the cam 85 up to its position shown in Fig. 13, and at the same time moves the bar 35 towards the inside of the body, so as to enable the folding to be effected without being hindered by the windows. The unfolding is effected in a similar manner.

The remainder of the device is identical with that described with reference to the previous figures.

Finally, in Fig. 16, a modification of the hoop 9 has been shown which, in order to enable folding to be effected without being hindered by the windows, has a slot 88 in the upright 14 for the window 3 to pass and its part 82 is thus outside the windows relatively to the inside of the body when the hood is unfolded.

While I have described what I at present consider preferred embodiments of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from my invention and I therefore aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim is:

1. In the combination of a folding hood with a vehicle body, a body provided on each side with at least one window, a front supporting hoop each arm of which is mounted on a side of said body for rotation between a rest position in which the intermediate part of said hoop is at the rear of the body and a working position in which said arm is at the fore of the rear end of said window and thus forms an intermediate upright, a front frame including on either side of the body a guiding bar and a further bar in line with said guiding bar and in sliding engagement therewith, a linkage between said bars and said supporting hoop for holding said bars and controlling said latter between the horizontal each arm of which is mounted on a side of said body for rotation between a rest position in which the intermediate part of said hoop is at the rear of said body and a working position in which said arm is at the fore of the rear end of said window and thus forms an intermediate upright, a carriage in engagement with each arm of said supporting hoop and adapted to travel along same, a guiding bar on each side of said body, a further bar carried by said guiding bar and in line and in sliding engagement therewith, a linkage between said bars and said supporting hoop adapted to hold and control said bars, connecting means between the rear end of said guiding bar and said carriage adapted to allow displacement of said guiding bar, when the hoop is unfolded, between a working position in which said bars are substantially above said window and a further position inside of the vehicle with reference to said window and enabling the folding movement to take place.

4. A combination of a folding hood with a vehicle body as claimed in claim 3 including controlling means operatively connected to the position of said carriage and adapted to automatically control the displacement of said guiding bar at least in the direction of the interior of the body during the first part of the corresponding folding stroke of the said carriage.

5. In the combination of a folding hood with a vehicle body, a body provided on each side with at least one window, a front supporting hoop each arm of which is mounted on a side of said body for rotation between a rest position in which the intermediate part of said hoop is at the rear of said body and a working position in which said arm is at the fore of the rear end of said window and forms an intermediate upright, a guide way provided in each of said arms, a carriage in engagement with said guide way and adapted to travel along same, a guiding bar on each side of the body, a further bar carried by said guiding bar and in line and in sliding engagement therewith, a linkage between said bars and said supporting hoop adapted to hold and control said bars, carrying means for the rear end of said guiding member, a connecting rod included in said carrying means for connecting said latter to said carriage, said connecting rod being pivoted on said carriage about an axis fore and aft directed with reference to said vehicle and carrying a further pin, parallel with said axis and connected to said rear end, the distance between said last named pin and axis corresponding to the necessary movement of the rear of said guiding bar to be brought from its working position in which said connecting rod is substantially

the hood, at the upper end of the stroke of the carriage.

8. In the combination of a folding hood with a vehicle body of which the front tapers, a body provided on each side with at least one window, a front supporting hoop each arm of which is mounted on a side of said body for rotation between a rest position in which the intermediate part of said hoop is at the rear of said body and a working position in which said arm is at the fore of the rear end of said window and forms an intermediate upright, a guideway provided in each of said arms, a carriage in engagement with said guide way and adapted to travel along same, a guiding bar on each side of the body, a further bar carried by said guiding bar and in line and in sliding engagement therewith, a stop adapted to limit the extension motion of the whole formed by said guiding and further bars, an end connecting nose-piece, a connecting member pivoted both to said piece and said further arm about substantially vertical axes and adapted to be displaced between a position corresponding to the folded hood and in which it is substantially transversal with reference to the body and a second position in which it is alined with said further arm, a pivot pin carried by said connecting member and substantially transversal with reference to the vehicle, at least one further pivot pin substantially parallel with said last named pivot pin and carried by said supporting hoop, a holding and controlling linkage pivoted to said last named pivot pin adapted to control the motions of said further bar, a hinge bracket, the rear end of said guiding bar being mounted on said hinge bracket for pivotal movement about an axis which is transversal with reference to the vehicle, a connecting rod, the two ends of said connecting rod being respectively pivoted on said carriage and on said hinge bracket about fore and aft directed axes with reference to the vehicle, the distance between said last named axes corresponding to the necessary movement of the rear of said guiding bar to be brought from its working position in which said connecting rod is substantially horizontal to a position in which said guiding bar is inside the body with reference to the window and conversely.

9. A combination as claimed in claim 8 including a guiding cam carried by said arm and adapted to engage said connecting rod thus controlling at least the motion of said connecting rod in the direction corresponding to the folding of the hood, at the upper end of the stroke of the carriage.

10. A combination as claimed in claim 3 in which said arm is provided with a guide way, at least two rollers being carried by said carriage and being adapted to carry the latter.

11. In the combination of a folding hood with a vehicle body, a body provided on each side with at least one window, a front supporting hoop each arm of which is mounted on a side of said body for rotation between a rest position in which the intermediate part of said hoop is at the rear of said body and a working position in which said arm is at the fore of the rear end of said window, and forms an intermediate upright, a guide way provided in each of said arms, a carriage in engagement with the guide way and adapted to travel along same, projecting guiding members substantially transverse with reference to the body and rigid with said carriage, a plate member carried by said projecting members for movement along same, a cam member carried by said arm and adapted to be resiliently engaged by said plate and to displace said latter along said projecting members at the end of the unfolding motion of the hood and conversely at the beginning of the folding motion, and a front frame carried by said plate for supporting the forward part of the hood.

12. In the combination of a folding hood with a vehicle body the rear part of which is provided with a recess adapted to contain the folded hood and which is provided on each side with at least one window, a front supporting hoop each arm of which is mounted on a side of said body for rotation about an axis disposed within said recess between a rest position and a working position in which said arm is at the fore of the rear end of said window, a member rigid with the part of said arm disposed within said recess, a connecting rod pivoted within said recess, a further connecting rod pivoted both to said last named connecting rod and to said member, a rear hoop adapted to carry the rear portion of the covering piece and pivoted at the end of said first named connecting rod, thus enabling said hoop to penetrate in said recess without substantially rearward movement.

13. A combination as claimed in claim 12 including projecting parts rigid with the arm of said rear hoop and a further hoop pivoted at the end of said parts and adapted to carry the front end of the rear portion of the covering piece.

14. A combination as claimed in claim 12 including projecting parts rigid with the arm of said rear hoop and a further hoop pivoted at the end of said parts and adapted to carry the front end of the rear portion of the covering piece, a projection rigid with the arms of said further hoop and a still further hoop pivoted at the end of said projection.

MAURICE BERSONNEAU

[redacted] and which includes a front supporting hoop hinged on the body, and, on the other hand, a front frame carried by said supporting hoop and essentially formed on either side of the body by a longitudinal bar having telescopic elements and a linkage between said bar and said hoop controlling the various folding and unfolding movements and is characterised in that, on the one hand, the aforesaid supporting hoop is mounted on either side of the body for pivotal displacement about a pivot carried by the body and is arranged in such a manner that its arm is, when in the position of use, at the fore of the rear end of the window adjacent to the rear seats of the vehicle and thus forms an intermediate upright, the shape of said hoop and the arrangement of the front frame being such that the pivoting of the whole arrangement for folding is not hindered by said window when in its raised [redacted] ence will be made in the specification solely to hoods of this type.

One embodiment of my invention is intended more particularly but not exclusively for hoods for bodies of which the front tapers and for this purpose the nose-piece of the hood is connected to the end of the longitudinal telescopic bar by an intermediate part on which are pivoted about vertical pivots, said bar, said nose-piece and an extension carrying the pivot pin of the lever of the hinged system controlling the unfolding and the folding.

According to this embodiment, the connection between the carriage sliding along the arm of the supporting hoop and the telescopic bar is effected by means of a connecting rod which is pivoted both on said carriage and on the hinge bracket of the telescopic bar about pins which are parallel with the longitudinal axis of the vehicle,

point, the pivot pin of an intermediate hoop.

Other features and advantages of the invention will moreover become apparent from the ensuing description taken with reference to the accompanying drawings which is given solely by way of example and in which:

Fig. 1 is a partly broken away side view showing the unfolded hood,

Fig. 2 is a view corresponding to Fig. 1 and showing the hood in an intermediate position,

Fig. 3 is a view corresponding to Figs. 1 and 2 and showing the hood in its folded position, the waterproof fabric being removed,

Fig. 4 is a section on a larger scale along the line IV—IV of Fig. 1, the hinged system for controlling the folding and unfolding being removed together with the front window,

Fig. 5 is a similar view to Fig. 4 of the whole arrangement during folding shown in Fig. 2,

Fig. 6 is a section along the line VI—VI of Fig. 4,

Fig. 7 is a plan view showing the corresponding position of the front part of the frame of the hood.

housing 8, on a pivot 26 carried by the body and at some distance from the pivot 12.

The plate 28 is provided with a shoulder 27 carrying a pivot 29 the axis of which is parallel with the longitudinal axis of the vehicle and on which is pivoted a connecting rod 31 of suitable length.

The connecting rod 31 engages a guiding cam 28 fixed by screws or the like on the forward face of the arm 14. The guiding edge of the cam 28 comprises a rectilinear part along the arm or upright 14 and parallel with said latter and is terminated slightly below the upper end of the guideway 17 by a curved part 30 guiding the pivoting motion of the connecting rod 31 about the pivot 26 when the plate or carriage 28 is displaced in the vicinity of said upper end, whereby said connecting rod 31 is displaced either from the horizontal position shown on Fig. 4 to the position shown on Fig. 5 in which it is parallel with the arm 14 or from said latter position to the horizontal position.

The connecting rod 31 carries a pivot 32 parallel with the pivot 29 and on which is mounted

Vehicle Hood

I, MAURICE BESSONNEAU, of French nationality, of 8 Bis, Rue Delarivière-Letoulon, Puteaux (Seine), France, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to a new arrangement of hood adapted to be attached to the body of a vehicle and to allow the transformation of an inside driving car having four or more places into a torpedo, or vice versa, this being completely carried out as the said vehicle hood will cover in the first place the entire car and will then be made to disappear completely.

The hood according to my invention comprises the combination of a rear framework pivoted to the body of the vehicle and adapted to fold up fanwise or the like with a front framework including on each side a guiding arm and a further arm in sliding engagement with and aligned with it, the structure formed by said two last named arms being connected, on the one hand, to at least one fixed point of said rear framework, and on the other hand, to a point of said body spaced from the pivot point of said rear framework, in such a way that, when the latter is folded up, this will cause the folding of the front framework and will bring it against the folded rear framework.

According to a preferred embodiment of my invention, the hood comprises on each side a travelling member in sliding engagement with a support included in said rear framework, a lever pivoted to said travelling member and to said point spaced from the pivot point of said rear framework, a guiding arm connected to said travelling member, a point of which arm is bound to turn about a fixed point of said support by means of a link or the like, a further arm in sliding engagement with and aligned with said guiding arm, and connecting levers between said further arm and said support whereby said further arm is adapted to slide relatively to said guiding arm upon rotation of said support.

The accompanying drawings show by way of example a form of construction of the vehicle hood according to my invention.

Fig. 1 is a longitudinal section.

Fig. 2 is a plan view of one side of the framework with the canvas removed.

Fig. 3 is a partial view showing the vehicle hood in the process of folding.

In the form of construction shown in the drawings, the rear framework supporting the canvas *t* comprises three hoops 1, 2 and 3, the third hoop being pivoted to the first at *3a*, and the second to the third at *2a* whilst the first hoop is pivotally mounted, on each side of the vehicle, on an axle 4, and thus the whole device can be folded up fanwise.

A strong spring 5 attached at 6 acts normally to oppose the folding movement, and thus gives the necessary tension to the canvas.

The front part of the hoop 1 of the rear framework includes a support 1*a* which, when the canvas is in use, has a vertical position in register with an upright 7 pertaining to the carriage-body. This part, which is adapted to be used as a door frame, is preferably provided with an angle-piece covered with an indiarubber member 8 serving as an upright of the window frame.

The front framework comprises a hoop 9, a pointed end-piece 10, a guiding arm 13 and a further arm 11 in sliding engagement with and aligned with said guiding arm. In the example shown in which the body becomes narrow towards the front, the said end-piece is connected to the end of the sliding arm 11, by means of a member 10*a* pivoted to said arm and to said piece upon vertical axes (Fig. 2) whilst the hoop 9 is preferably connected to arm 13 by means of a member 12, also pivoted on vertical axes.

The guiding arm 13 is connected at a point adjacent to its rear end by a link 14 to a projection of a travelling member 17 movable along bar 1*a*. Said projection is guided in a slot 18 in said bar and includes a pivot part upon which is pivoted one end of a link 15, the other end of

[*Price* 1/-]

frame of a door of the vehicle and is preferably provided with an indiarubber piece forming an upright for a window frame.

6. A hood as claimed in Claim 1 in which the forward part of the body becomes narrow towards the front, and wherein the end piece of the hood is connected to the end of said sliding arm by means of a member pivoted to said arm and to said end pieces on preferably vertical axes.

7. A hood as claimed in Claim 1 in which the hoop or hoops are connected to the arms by means of members pivoted on preferably vertical axes.

8. A hood as claimed in Claim 1 in which the folding operation is effected against the action of a spring which presses against the front part of the rear framework, thus assuring the tension of the canvas when in use.

9. A hood as claimed in Claim 1 wherein the rear framework is provided with means for rotating it.

10. A hood as claimed in Claim 9 wherein said means includes an electric motor provided with a speed reducing gear and a reversing switch.

11. A hood as claimed in Claim 1 in which the space provided for the folded hood in the rear at the sides is adapted to be closed by flaps which ensures the continuity of the torpedo outline and which are preferably provided with controls, independent or not.

12. A hood as claimed in Claim 1 in which the end of the canvas is fixed within the space provided for the folded hood in the rear of the vehicle body.

13. A hood substantially as described and represented in the annexed drawings.

Dated the 12th day of July, 1935.

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Chartered Patent Agents.

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other end on a pivot 67 carried by the actuating quadrant 11.

The end of each arm of the hoop 66 has an upwardly directed extension 69 which carries the hinge pin 70 of an intermediate hoop 71 on which is fixed the end of the cloth 8 forming the rear portion of the hood. Each arm of the hoop 71 is slightly extended below the hinge pin 70 and has at the end of this extension a hinge pin 73 of another intermediate hoop 74.

The whole arrangement is completed by a driving device for the quadrant 11, for example by an electric motor not shown, and by means of a chain 76 and of sprockets 78 and 79.

The U-shaped opening of the housing 5 can be closed by flaps not shown, as described in my co-pending application Serial No. 46,845.

The operation is as follows:

In the position shown in Fig. 1, the hood is unfolded that is to say that the nose-piece 38 rests on the wind screen 39, the bar 35—36 is substantially in contact with the upper edge of the windows 2, the carriage 30 is in its upper position at the upper end of the guideway 17, the intermediate connecting rod 31, as shown in Figs. 4 and 6, is horizontal and the connecting member 48 is in alignment with the bar 36 as shown in Fig. 7.

of its vertical position, the sliding bar 35 as at the end of its travel within bar 36 which is limited by a stop and the lever 47 pushes the tail 44 and swings the connecting member 48. The lateral displacement of the telescopic bar 35—36 which then takes place positively causes the intermediate connecting rod 31 to swing about the pivot 29 and along the curved part 30 so that the bar 35—36 passes from the position shown in Fig. 11 to the horizontal position shown in Fig. 10. The pull exerted on the strips of fabric connecting the hoops to each other in the usual manner as known, causes the displacement of the rear portion of the hood.

It will be seen that the two operations can take place without being hindered by the windows whether they be in the lowered position or not.

Referring to the modification shown in Figs. 12 to 15, the pivots 21 and 22 of the rollers 18 and 19 mounted in the guide-way 17 provided in the upright 16 of the hoop 9 are extended a length which is at least equal to that of the transverse displacement it is desired to allow the rear end of the bar 36. The plate 28 is slidably mounted on the extensions of said pivots 21 and 22 and is subjected to the action of springs 81 and 82 which urge same in the direction of the upright

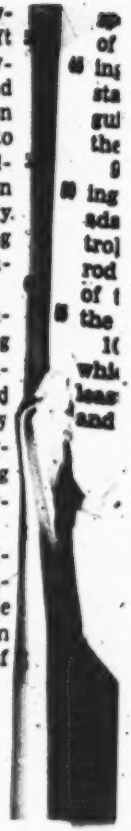
at the rear of the body and a working position in which said arm is at the fore of the rear end of said window and thus forms an intermediate upright, a front frame including on either side of the body a guiding bar and a further bar in line with said guiding bar and in sliding engagement therewith, a linkage between said bars and said supporting hoop for holding said bars and controlling said latter between the horizontal position in which said bars are above said window and a folded up position, connecting means between the rear end of said guiding bar and said arm adapted to allow said guiding bar to be displaced between a working position in which it is above said window and a further position in which it is laterally displaced to allow the folding of the hood without being hindered by said window.

2. A combination as claimed in claim 1 in which said body is provided on each side with a fore and a rear window and wherein each arm of said supporting hoop is disposed in its working position substantially vertically and between said two side windows.

3. In the combination of a folding hood with a vehicle body, a body provided on each side with at least one window, a front supporting hoop, to said carriage, said connecting rod being pivoted on said carriage about an axis fore and aft directed with reference to said vehicle and carrying a further pin, parallel with said axis and connected to said rear end, the distance between said last named pin and axis corresponding to the necessary movement of the rear of said guiding bar to be brought from its working position in which said connecting rod is substantially horizontal to a position in which said guiding bar is inside the body with reference to the window and conversely.

6. A combination as claimed in claim 5 comprising a hinge bracket, included in said carrying means between said guiding bar and said connecting rod, said last named pin being carried by said hinge bracket, a further pin transversally directed with reference to the vehicle and carried by said hinge bracket, said guiding bar being mounted for pivotal movement about said further pin.

7. A combination as claimed in claim 5 including a guide cam carried by said arm, said connecting rod being adapted to engage said guide cam which positively controls at least its motion in the direction corresponding to the folding of



[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1

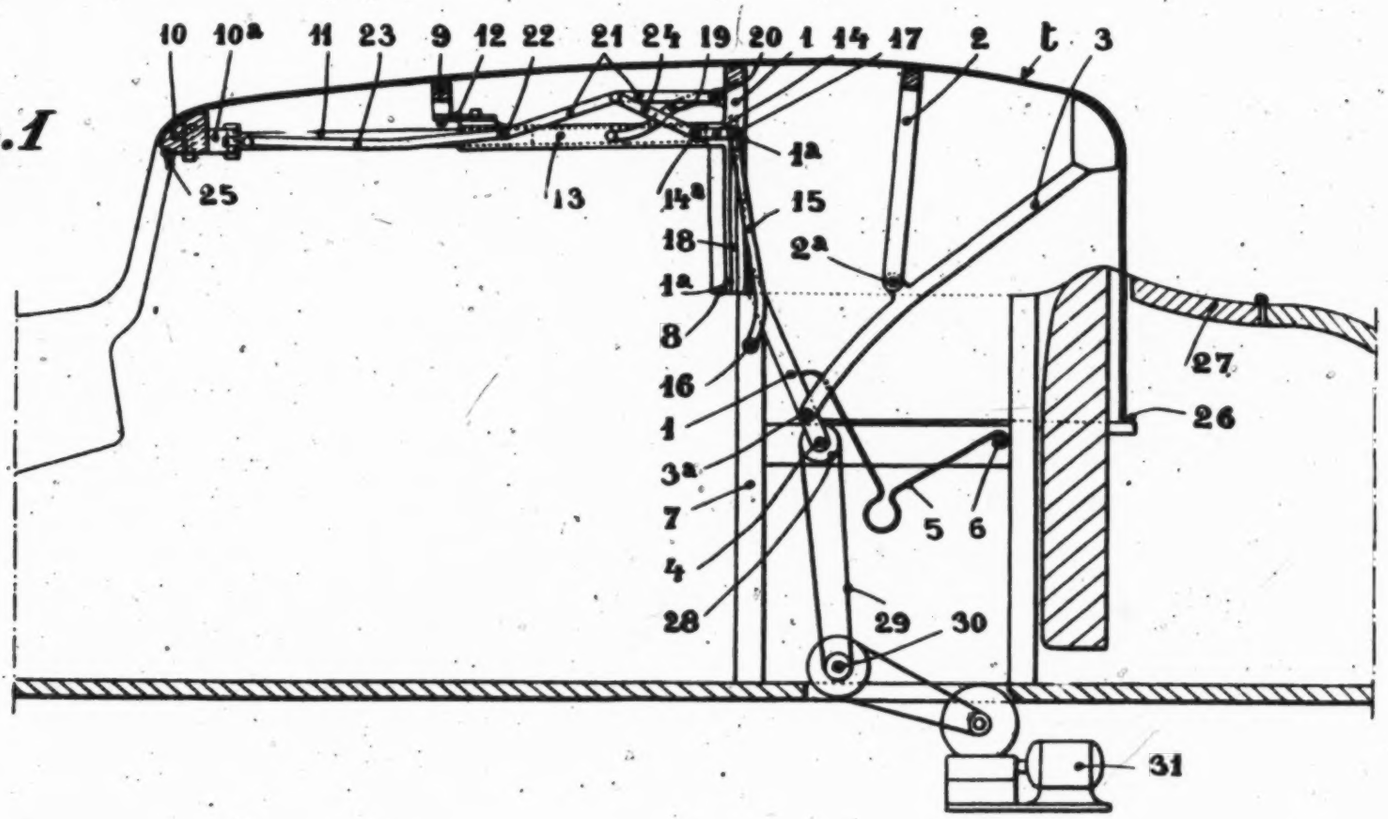


Fig. 3

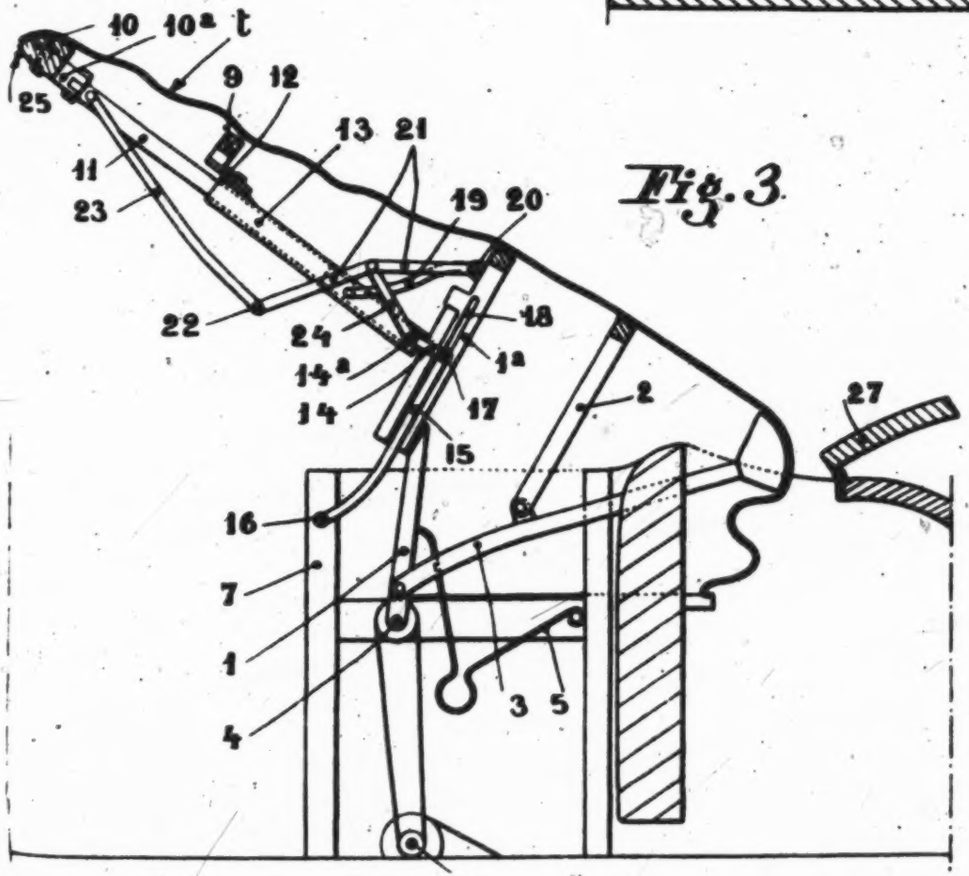
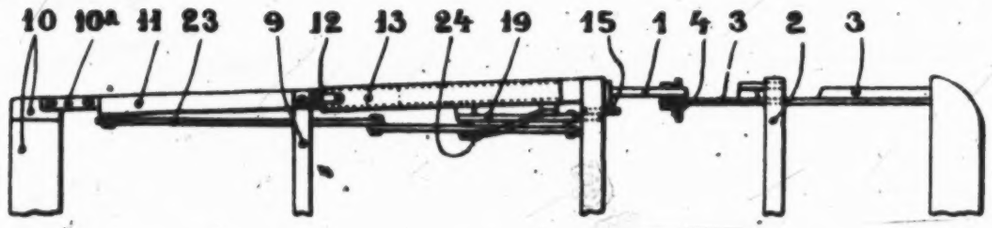


Fig. 2



April 17, 1951 J. W. J. ACKERMANS 2,549,153

FOLDING TOP FOR AUTOMOBILES

Filed May 1, 1946 3 Sheets-Sheet 1

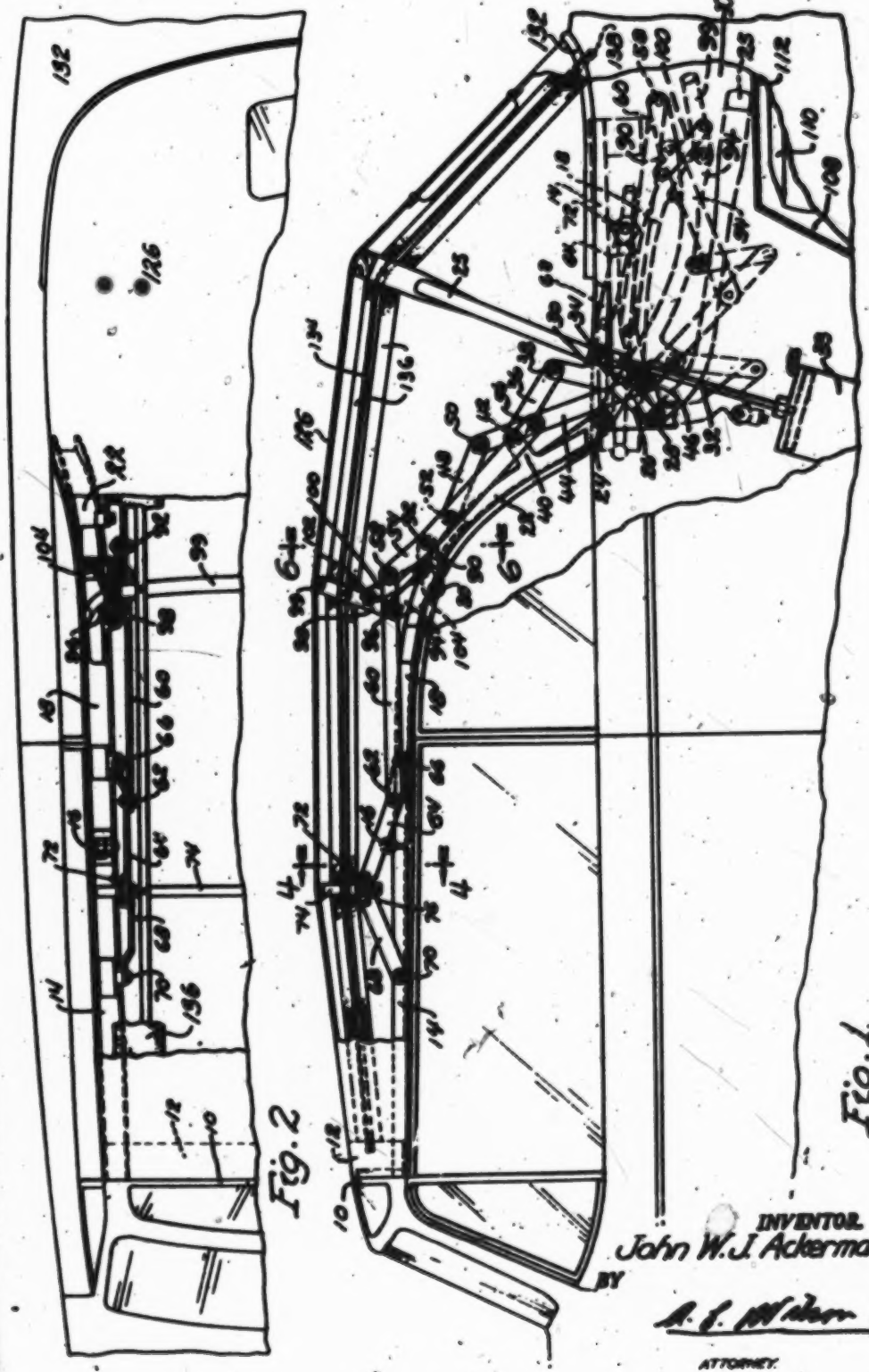


Fig. 2

Fig. 1

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FOLDING TOP FOR AUTOMOBILES

Filed May 1, 1946 3 Sheets-Sheet 2

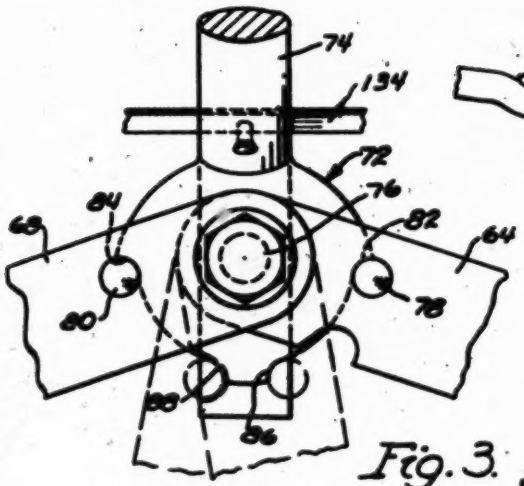

Fig. 3.

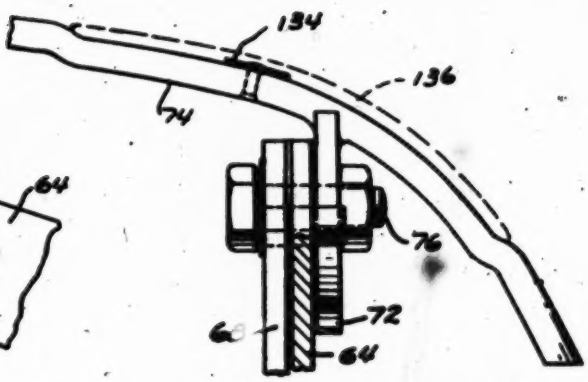

Fig. 4.

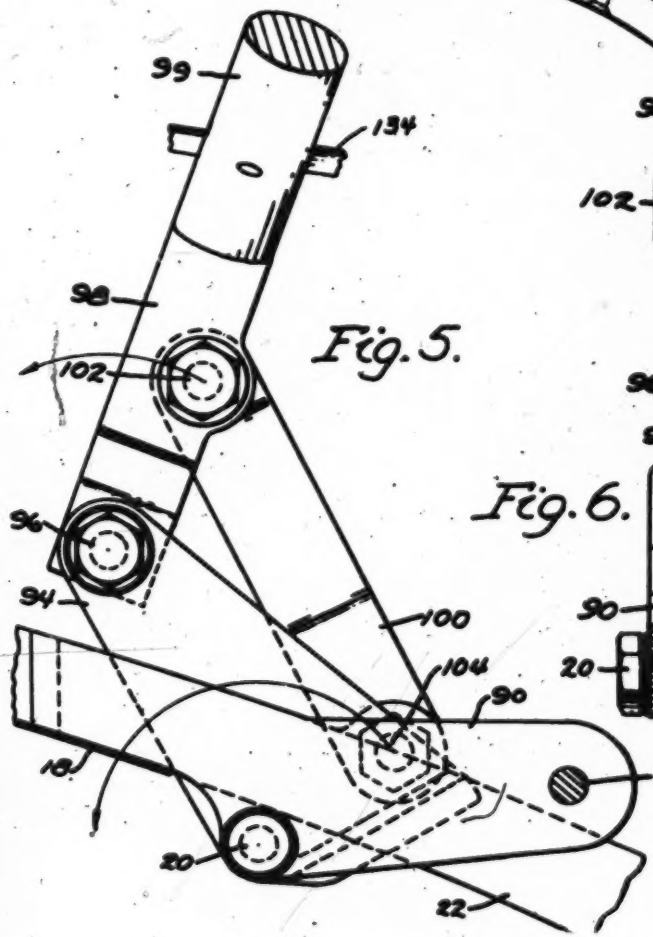

Fig. 5.

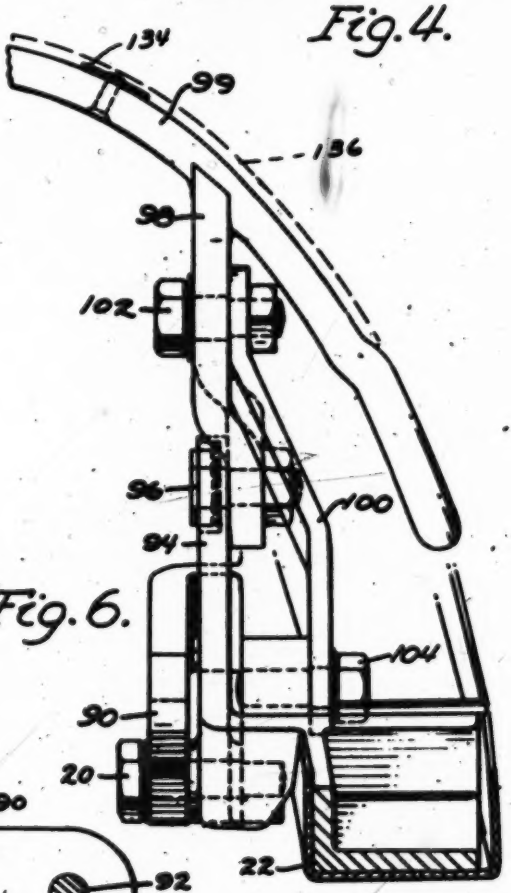

Fig. 6.

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BY

which is pivoted to a fixed point 16 spaced from the pivot axle 4 of the rear framework. On the other hand, a point of the arm 13 is bound by means of a link 19 to turn about a fixed point 20 of the support 1, this fixed point being represented by an axle which traverses a lug and also serves as a pivot for another link 21. This latter forms a toggle joint with another link 23 pivoted at 22 to it and leading to the front end of the arm 11. Lastly, the guiding arm 13 is connected by a connecting rod 24 to the link 21, said rod being pivoted on the pivot point 14*a* of the link 14 upon the arm 13.

When the canvas is in use, the studs 25 mounted on the end-piece are engaged in the upper edge of the windscreen-frame. At its other end, the canvas is attached at 26-to a small cross-piece within a space provided for the folded hood at the rear of the vehicle.

A transverse flap 27 serves normally to close the upper part of said space. In the represented construction, in which a spider is provided, the said flap coincides with the outline of the spider. Two other flaps, in longitudinal situation (not shown) are preferably mounted at the sides, between the upright 7 and the flap 27, in order further to conceal the folded hood.

Supposing the case in which there is no mechanical control, it will be readily observed that after raising the flaps, the operator can fold up the whole arrangement by simply turning the hoop 1 to the rear, about the axle 4 used as a pivot. Fig. 3 shows one step in this folding. The folding of the rear part is directly due to the movement of the hoop 1 and the folding of the front part is due to the drawing of travelling member 17 by the bar 1*a*, which thus pivots the link 15; this causes a sliding of the end of the arm 13 along 1*a* and, by the connecting rod 24, the folding of the joint 21—23, so that the arm 11 will telescope into the arm 13 which latter will gradually come near 1*a* and will be superposed upon the same.

However, it is feasible to employ for operate in the contrary direction and thus return the hood to the position shown in Fig. 1.

It is also feasible to utilize the engine of the vehicle itself by the use of suitable transmission gear and the like, or use can be made of vacuum.

Obviously, the invention is not limited to the form of construction represented and described which have been chosen solely by way of example.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. A vehicle hood comprising the combination of a rear framework pivoted to the body of the vehicle and adapted to fold up fanwise or the like with a front framework including on each side a guiding arm and a further arm in sliding engagement with and aligned with it, the structure formed by said two last named arms being connected, on one hand, to at least one fixed point of said rear framework, and on the other hand, to a point of said body spaced from the pivot point of said rear framework, in such a way that when the latter is folded up, this will cause the folding of the front framework and will bring it against the folded rear framework.

2. A hood as claimed in Claim 1 comprising, preferably on each side, a travelling member in sliding engagement with a support included in said rear framework, a lever pivoted to said travelling member and to said point spaced from the pivot point of said rear framework, a guiding arm connected to said travelling member, a point of which guiding arm is bound to turn about a fixed point of said support by means of a link or the like, a further arm in sliding engagement with and aligned with said guiding arm, and connecting levers between said further arm and said support whereby said further arm is adapted to slide relatively to said guiding arm upon rotation of said support.

April 17, 1951 J. W. J. ACKERMANS 2,549,153

FOLDING TOP FOR AUTOMOBILES

Filed May 1, 1946 3 Sheets-Sheet 3

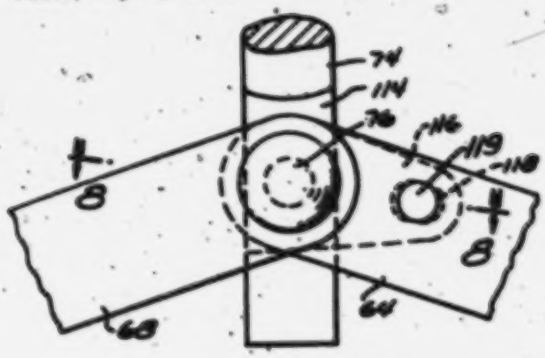

Fig. 7.

Fig. 8.

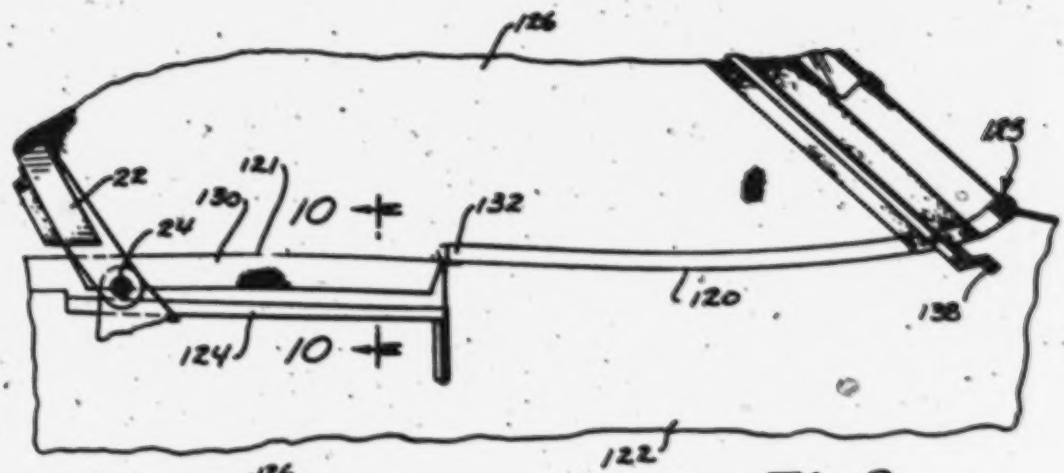

Fig. 9.

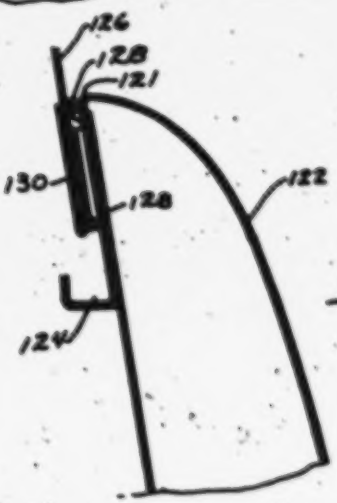

Fig. 10.

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Patented Apr. 17, 1951 2,549,153

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2,549,153

FOLDING TOP FOR AUTOMOBILES

John W. J. Ackermans, Detroit, Mich.

Application May 1, 1946, Serial No. 666,413

18 Claims. (Cl. 296—107)

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This invention relates to collapsible tops for motor vehicles, and more particularly to an improved top construction so designed as to provide maximum seating capacity, spare wheel and luggage space, and a smaller top booth inside the vehicle to provide minimum interference when the top is moved to the collapsed position.

A great deal of effort has been devoted to the design of collapsible tops, but the tops heretofore developed have possessed inherent disadvantages in that they have been cumbersome to operate and did not possess any readily operable positive means for locking some of the top bows in predetermined up or down positions to provide a rigid construction that would withstand the vibration and shock loads to which tops are subjected in use, and prevent rattle of the actuating means.

An object of this invention is to provide a collapsible top designed to provide minimum interference when in the folded position, and embodying mechanism to securely hold the top bows when in the up position in such a manner that vibration and shock loads to which the top is subjected will not loosen the top or cause it to rattle.

An important object of this invention is to permit the folding top to nestle in a shallower space or booth above a shelf under which the spare wheel may be stored in such a manner that when the top is down it is substantially flush with the general lines of the upper body contour of the vehicle.

A further object of the invention is to provide an improved folding top so designed as to provide maximum seating capacity particularly in the rear seat, a relatively short and narrow space being provided behind and at the sides of the rear seat to form a booth or compartment for the reception of the top when in the folded or collapsed position.

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of the body at the belt line whereby no snap fasteners are required on the outside of the body to insure a tight weatherproof joint.

Still another object resides in the provision of an improved separable juncture seal or barrier associated with the lower forward portion of the top fabric extending downwardly within the body and its inner wall adjacent the belt line, whereby the top fabric or material remains inside the body at all times and need not be manually moved to the outside of the body surface to prevent leakage after the top has been raised to the up or elevated position.

Another object of the invention resides in the provision of a collapsible top adapted to permit greater coordination between the styling of the top and body of the vehicle, thus improving the general appearance of vehicles having convertible tops.

Other objects and advantages of this invention will be apparent from the following detailed description considered in connection with the accompanying drawings, submitted for purposes of illustration only, and not intended to define the scope of the invention, reference being had for that purpose to the subjoined claims.

In the drawings wherein similar reference characters refer to similar parts throughout the several views:

Fig. 1 is a side elevation, partly in section, of a vehicle embodying this invention.

Fig. 2 is a fragmentary top plan view partly in section of the vehicle illustrated in Fig. 1.

Fig. 3 is a fragmentary side view of the auxiliary bow control and locking mechanism illustrated in Fig. 1.

Fig. 4 is a sectional view taken substantially on a line 4—4 of Fig. 1 looking in direction of the arrows.

Fig. 5 is a fragmentary side view of the main bow control mechanism.

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on the line 10—10 of Fig. 9 looking in the direction of the arrows.

Before explaining in detail the present invention, it is understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Referring now more particularly to Fig. 1 it will be observed that a header bar 10 is fixedly secured to a vehicle body. The header bar 10 may be provided with front and top windows to insure good visibility from the driver's compartment of the vehicle.

A front bow 12 to which is secured the fabric or other suitable covering of the top material is carried by front side rails 14 in such a manner as to be rigid therewith. In the description hereinafter, only one side of the top is described, but it will be understood that the other side may be similarly constructed. The rear end of the side rail 14 is connected by a pivot 16 to the forward end of a rear side rail 18, which in turn is connected by a pivot 20 to a folding pillar 22. The pillar 22 is hingedly mounted on a main top pivot 24 carried by a suitable bracket secured to the body of the vehicle.

A rear bow member 25, and a lower power link 28 are pivotally mounted at 29 on a suitable bracket secured to the body of the vehicle. An arm 30 carried by the lower power link 28 is pivotally secured to a reciprocable rod 32 of a power unit 33 by means of a yoke 34 in such a manner that actuation of the power unit 33 oscillates the power link 28 about the pivot 29 to raise and lower the top. The power unit 33 may be actuated in any convenient manner as by compressed air, vacuum, hydraulic or electric power.

In the event the power unit should fail for any reason, the top may be elevated or lowered manually by lifting the front bow and the front side rails. The interconnected links and levers guide the top structure accurately to the header bar 10 as the top is being elevated, and guide it into the storage booth when the top is lowered. The interconnected links and levers may be said to be self-contracting since the framework is so designed and proportioned as to maintain accurate alignment to move the interconnected elements to predetermined positions as the front bow and the front side rails are moved manually or the actuating mechanism moves the main bow carrying members.

An upper power link 36 is secured by means of a pivot 38 to the upper end of the lower power link 28. The opposite end of the upper power [illegible] pivoted to an arm 42 carried

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intermediate portion of an auxiliary bow rear link 64 having one end 66 pivoted to an intermediate portion of the rear side rail 18. An auxiliary bow front link 68 is pivoted at 70 to an intermediate portion of the front side rail 14. The front and rear auxiliary bow links 68 and 64 are secured by means of a bolt or pivot pin 76 to a bracket 72 fixed to an auxiliary bow 74 as illustrated more clearly in Figs. 3 and 4. As shown in Fig. 4, the outer portion of the bow slopes downwardly at a considerable angle, and the bracket 72 is secured to the bow at a substantial distance from the end thereof.

The auxiliary rear and front bow links 64 and 68 are provided with stop members 78 and 80 adapted to move into engagement with shoulders 82 and 84 on the bracket 72 when the top is in the up position, and to move into engagement with shoulders 86 and 88 carried by the same bracket 72 when the top is in the down position.

A bracket 90 is fixed to the rear part of the side rail 18 and is connected by a pivot 92 to an intermediate portion of the balancing link 54 as illustrated. A bracket 94 fixed to the folding pillar 22 is pivotally connected at 96 to a main bow supporting bracket 98 carrying a main bow 99 as more clearly illustrated in Figs. 5 and 6.

A quadrant 100 is pivoted at 102 to an intermediate portion of the main bow supporting bracket 98, and is pivoted at its lower end to the bracket 90 on the rear part of the side rail 18 at 104.

The pivots 24, 29 and 46 may be carried by a single bracket secured in the side of the vehicle body.

The operation of this collapsible top is as follows. When the top is in the up position as illustrated in Figs. 1 and 2, it is only necessary to release the locking catches (which may be of the type shown in Ackermans Patent No. 2,486,905, issued November 1, 1949) securing the front bow 12 to the fixed header bar 10, and actuate a control mechanism whereupon the rod 32 of the power unit 33 moves downwardly to oscillate the lower power link 28 about its pivot 29 in the clockwise direction as viewed in Fig. 1. Oscillating movement of the lower power link 28 is transmitted through the upper power link 36 to rotate the folding pillar 22 about the main top pivot 24 in the clockwise direction. Rotation of the folding pillar 22 is transmitted through the lower and upper balancing link control members 44 and 48 and the balancing link 54, auxiliary bow control bar 60, rear and front auxiliary bow links 64 and 68, to move the top to the down position as illustrated in dotted lines in Fig. 1.

It will be noted that when the top is moved to the down or collapsed position it folds into a compartment or booth 106 extending across the back and along the sides of the rear seat of the vehicle. A space 108 is provided beneath a pa[illegible]

vide suitable clearance and avoid interference with the other elements of the top construction when the top is moved to the down or stored position. This action is obtained by selecting the distance between the pivots 102 and 104 of the quadrant 100 in such a manner that the quadrant 100 exerts a pushing force to move the main bow 90 in the counter-clockwise direction as viewed in Fig. 5, when the lowering action of the top starts, and this pushing force is reversed in such a manner that the quadrant 100 exerts a tensioning or pulling force as the pivot 104 operating on the smaller arc passes under the pivot 102 pivoting about a larger arc as illustrated in Fig. 5. The exact position of the main bow 90 in the booth or compartment 106 can thus be accurately determined by proper selection of the points 102 and 104 with relation to the length of the quadrant 100 to insure easy storage of the top in the booth or compartment 106.

Attention is also directed to the fact that the auxiliary bow 74 is maintained in a predetermined angular relation relative to the side rails 14 and 16, both when the top is in the up and in the down positions.

The stop members 78 and 80 carried by the links 64 and 68 contact the stop shoulders 82 and 84 on the auxiliary bow bracket 72 as illustrated in Figs. 1 and 3 when the top is in the up position to maintain the auxiliary bow 74 in a substantially vertical position.

During the time when the top is being moved to the down position the auxiliary bow 74 is free to move angularly about the pivot 76 under the influence of the force exerted by the tension members 134 secured to the spaced bows, or the force exerted by the top material, or by the padding strips 136. One of these forces may be employed individually or they may all act concurrently. As the top approaches the down position illustrated in dotted lines in Fig. 1 the stop members 78 and 80 carried by the links 64 and 68 contact the stop shoulders 86 and 88 of the auxiliary bow bracket 72 to force the auxiliary bow 74 to occupy a substantially horizontal position between the side rails 14 and 16. The auxiliary bow is thus maintained in a non-obstructing position, and the top is folded in such a manner as to occupy minimum space in the booth or compartment 106. If the position of the auxiliary bow were not controlled it would move angularly to an obstructing position by the force of gravity and occupy a substantially vertically downwardly directed position or be pulled upwardly by the top fabric etc. thereby preventing compact folding of the top mechanism.

Figs. 7 and 8 illustrate a modified form of auxiliary bow actuating mechanism. The auxiliary bow 74 is secured to a bracket 114 having an arm 116 extending in parallel and contacting relation to the auxiliary bow rear link 64 and other link will move its associated side rail proportionately to the movement of the auxiliary bow 74.

Figs. 9 and 10 illustrate my improved construction for pressing the fabric of the folding top to the inside of the vehicle body in such a manner that the top material will be maintained in a predetermined position at all times when the top is up. The belt line of the body is indicated by the lines 120, 121 at the rear and forward portions respectively of the body, the line 120 being the lower edge of the belt molding 132, which serves to secure the lower edge of the rear portion of the top material 126 permanently in place, as indicated at 123 in Fig. 9. The line 121 represents the upper edge of the body panel 122, and the top material is not secured thereto, but is so arranged that it will fit snugly against the inner surface of the panel 122 when the top is in raised position. A trough 124 is provided to carry away water seeping through the juncture between the top and the body.

As illustrated, the top material 126 formed of fabric or any other suitable material is provided with seals 128 in the form of fins to contact the inner edge of the body at and below the belt line 121 to minimize the seepage of water through the juncture between the top and the body of the vehicle.

The lower forward portion of the top material is folded or reinforced with a weather-stripping section 130 having the seals 128 carried thereby. With this construction the top material having the weather-stripping section 130 attached thereto will be maintained in contact with the body at and below the belt line 121 when the top is up, and as the top has been moved to the final up position it will be unnecessary to manually lift the top material over the belt line 121 as is the case in many previous designs. In this manner a more workmanlike construction is provided, and longer life of the top is insured because it is not subjected to strains and distortions. The top material 126 is secured to the folding pillar 22 in such a manner that when the top is in the up position the portion between the belt molding 132 and the folding pillar is maintained under tension through the force exerted by the forward pull of the pillar.

Means are provided to maintain the top mechanism taut at all times, and to position each of the top carrying bows in a substantially predetermined position relative to the other portions of the top mechanism.

One desirable form of design includes tension members 134 interposed between the bows and padding 136 or incorporated in the padding 136. One end of each of the tension members is secured to the body of the vehicle as illustrated at 138, and the other end is secured to the front bow 12.

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As the top moves to the down position the tension members 134 move with the top material, and assume the folded position. The tension members 134 are preferably formed of relatively resilient non-stretchable material capable of transmitting considerable force, such for example as strips of steel ribbon or other material possessing the desired properties enumerated above.

I claim:

1. A main bow actuating mechanism for a folding top for a motor vehicle comprising a folding pillar, a bracket secured to the folding pillar, a side rail, a bracket secured to the side rail, main pivotal connecting means between both brackets, a main bow having an extension pivotally mounted on the upper end of the first mentioned bracket, and a quadrant pivotally connected to the extension and to the second mentioned side rail bracket at a point behind the main pivotal connection of both brackets, whereby when the top is in the up position the main bow is held in a predetermined position, and whereby the main bow is induced to move counterclockwise about its extension's pivot when moving to the predetermined down position in the booth.

2. In a folding top for a motor vehicle having a booth, a folding pillar having an upper extension, a side rail having a rearward extension, a main pivot between the pillar and the side rail below the upper end of the pillar extension and forward of the side rail extension's rear end pivot, a main bow bracket pivotally connected to the upper end of the pillar extension, an upper pivot on said bracket, and intermediate pivot between the main pivot and forward of the side rail extension's end pivot, and a quadrant between the intermediate pivot in the side rail extension and the upper pivot of the main bow bracket, said quadrant moving the main bow gradually counterclockwise, when the top is being lowered, to a substantially horizontal position in the booth to clear other folding top elements.

3. In a folding top for a motor vehicle, a folding pillar, a bracket fixed to the folding pillar, a side rail, a bracket fixed to the said rail, a main pivot connecting said brackets, a main bow having an extension bracket pivotally mounted on the upper end of the first mentioned bracket above said main pivot, a quadrant pivotally connected to the bow extension bracket and connected to the second mentioned bracket at a point spaced from the main pivot, whereby while the pillar is moving to a folding position the quadrant will move the main bow counterclockwise to position the main bow in a predetermined location.

4. In a motor vehicle comprising a body having a substantially vertical inner side wall terminating in a longitudinal belt line; a folding top comprising flexible top material having its lower rear edge secured to said body adjacent said belt line and having forwardly of said rear edge

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that any leakage of water therethrough is received and carried off by said trough.

5. In a motor vehicle comprising a body having a substantially vertical inner side wall terminating in a longitudinal belt line; a folding top comprising flexible top material having its lower rear edge secured to said body adjacent said belt line and having forwardly of said rear edge a flap extending within said body to a lower level than the belt line and forming a juncture with said inner wall, means for impeding flow of water and air past said juncture comprising a lateral cushion associated with said flap, a folding pillar hinged to said body below said belt line and secured to and exerting forward tension on the lower portion of said top material so that said cushioned flap is pressed against the inner side wall when the top is in the up position, and a trough within said body below said juncture to receive leakage of water therethrough.

6. In a vehicle body having a side structure terminating at its upper edge in a substantially horizontal belt line; a folding top including flexible top material secured to a portion of said body adjacent said belt line and having forwardly of said portion a prolongation of said material extending downwardly within the body, said prolongation being formed with a lateral cushion coacting with an inner upper part of said structure to form a water-shedding juncture, a folding top pillar hinged to said body and secured to and exerting longitudinal forward tension on the lower front portion of said top material when the top is up to force said cushion into contact with said inner upper part of said structure.

7. In a vehicle body having a side structure terminating in a belt line; a folding top comprising flexible top material having the rear portion of its lower edge secured to the body adjacent the belt line and having the forward portion of said lower edge forming a prolongation of said material extending downwardly within the body below the belt line, a lateral cushion carried by said prolongation, a folding pillar hinged to said body and secured to said top material to exert forward pull thereon and press said cushion against an inner upper part of said side structure when the top is in the up position.

8. A vehicle body having an inner side wall terminating in a belt line and a folding top comprising flexible top material having its lower rear edge secured to a portion of said body adjacent said belt line and having forwardly of said portion a prolongation of said material extending downwardly within said body, a folding pillar hinged to said body, said material being secured to said pillar, and a cushion associated with said prolongation and inner wall when said top is in raised position and forming a separable weatherproof juncture adjacent said belt line permitting said top being put in lowered position.

9. A vehicle body having an inner side wall

wardly extending prolongation remaining within said body in the raised and lowered positions of said top and thus leaving said belt line exposed as viewed from outside said body.

10. A vehicle body having an inner side wall terminating in a belt line and a folding top comprising flexible top material having its lower rear edge secured to a portion of said body adjacent said belt line and having forwardly of said portion a prolongation of said material extending downwardly within said body, a folding pillar hinged to said body, said material being secured to said pillar, and a cushion associated with said prolongation and inner wall when said top is in raised position and forming a separable weatherproof juncture adjacent said belt line permitting said top being put in lowered position, the force exerted by the forward pivoting of said pillar being used to close said juncture when said top is in raised position.

11. A vehicle body having an inner side wall terminating in a belt line and a folding top comprising flexible top material having its lower rear edge secured to a portion of said body adjacent said belt line and having forwardly of said portion a prolongation of said material extending downwardly within said body, a folding pillar hinged to said body, said material being secured to said pillar, and a cushion associated with said prolongation and inner wall when said top is in raised position and forming a separable weatherproof juncture adjacent said belt line permitting said top being put in lowered position, the force exerted by the forward pivoting of said pillar being used to close said juncture when said top is in raised position, and a trough within said body to receive leakage of said juncture.

12. A vehicle body having an inner side wall terminating in a belt line and a folding top comprising flexible top material having its lower rear edge secured to a portion of said body adjacent said belt line and having forwardly of said portion a prolongation of said material extending downwardly within said body, a folding pillar hinged to said body, said material being secured to said pillar, and a cushion associated with said prolongation and inner wall when said top is in raised position and forming a separable weatherproof juncture adjacent said belt line permitting said top being put in lowered position, said downwardly extending prolongation remaining within said body in the raised and lowered positions of said top and thus leaving said belt line exposed as viewed from outside said body, the force exerted by the forward pivoting of said pillar being used to close said juncture when said top is in raised position, and a trough within said body to receive leakage of said juncture.

13. In a folding top for a vehicle having a side window, two frame members pivotally connected end-to-end and forming a folding side rail conforming when the top is up to the upper edge of said window, a transverse roof bow normally dis-

said arm detachably connecting the two together to prevent angular movement therebetween and thereby maintain said bracket and bow in predetermined angular relation to said first link, said pivot pin, bracket, arm, and interengaging means constituting the sole attaching means between said bow and said links.

14. In a folding top for a vehicle having a side window, two frame members pivotally connected end-to-end and forming a folding side rail conforming when the top is up to the upper edge of said window, a transverse roof bow normally disposed in a substantially vertical plane and having a downwardly sloping outer portion, a bracket fixed to said bow at a point spaced substantially inwardly from the end of the bow and extending downwardly from said point, a pivot pin carried by said bracket, two links each pivotally connected to one of said frame members and pivotally attached to said bracket by means of said pivot pin, and coacting stop members on said links and said bracket operative at least when the top is in the up position for maintaining said bow in a substantially vertical plane while permitting the bow to rotate relative to the links while the top is being raised or lowered.

15. In a vehicle body of the type having upper and lower sections delimited by a belt line; a door hingedly mounted on one side of the body and including a slidable window and a rotatable window located forwardly of the slidable window, said windows having adjacent rectilinear edges, a fixed windshield assembly having a rearward extension forming the forward portion of a roof, and a top forming the rear portion of the roof and movable to a down position within the rear portion of said lower section and to an up position in abutting relation to said extension to form therewith a juncture aligned with said edges, said top including side rails and constituting the sole connection above the belt line between said extension and the rear portion of said lower section, said extension forming a support for the forward end of said top when the latter is in up position.

16. In a motor vehicle body of the type having upper and lower sections delimited by a belt line; a door hingedly mounted on one side of the body and including a slidable window and a rotatable window located forwardly of the slidable window, a frame for one of said windows fixed to the door and having a rectilinear edge abutting an edge of the other window, a fixed windshield assembly including corner posts and a rearward extension forming the forward portion of a roof, and a top forming the rear portion of the roof and movable to a down position within the rear portion of said lower section and to an up position in abutting relation to said extension to form therewith a generally rectilinear juncture aligned with said edges, said top including side rails and constituting the sole connection above the belt line between said extension and the rear portion of said

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deflect windstream and terminating in substantial alignment with said edges, and a collapsible top movable to a down position within the rear portion of said lower section and to an up position in abutting relation to said extension and constituting the sole connection above the belt line between said extension and the rear portion of said lower section.

18. In a motor vehicle body of the type having upper and lower sections delimited by a belt line; a door opening in one side of said body, a door mounted in said opening and including a slidable window and a rotatable window located forwardly of the slidable window, said windows having adjacent abutting edges, a fixed windshield assembly forming a forward portion of said door opening and including a rearward extension forming a portion of a roof and terminating in alignment with said edges, a hooded covering forming the remainder of said roof and constituting the sole connection above the belt line between said extension and the rear portion of said lower section, and means for securing the forward edge of said covering to the rear edge of said extension.

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REFERENCES CITED

The following references are of record in the file of this patent:

12

UNITED STATES PATENTS

Number	Name	Date
381,944	Morts	May 1, 1888
876,768	Bowen	Jan. 14, 1908
1,014,583	Zellers	Jan. 9, 1912
1,173,390	Pease	Feb. 29, 1916
1,177,944	Freeman	Apr. 4, 1916
1,211,107	Dori	Jan. 2, 1917
1,447,191	Vetter	Mar. 6, 1923
1,748,736	Selje	Feb. 25, 1930
1,826,426	Ledwinka	Oct. 6, 1931
1,884,441	Welch	Oct. 25, 1932
1,952,252	Heuser	Mar. 27, 1934
2,040,680	Westrope	May 12, 1936
2,076,243	Marshall et al.	Apr. 6, 1937
2,128,849	Redfern	Aug. 30, 1938
2,184,537	Valletta	Dec. 26, 1939
2,257,951	Haberstump	Oct. 7, 1941
2,267,471	Keller	Dec. 23, 1941
2,376,949	Westrope	May 29, 1945
2,382,635	Humer	Aug. 14, 1945
2,447,059	Eaton et al.	Aug. 17, 1948
2,448,054	Seckel	Aug. 31, 1948

FOREIGN PATENTS

Number	Country	Date
6,851	Great Britain	1915
21,124	Great Britain	1913
236,742	Great Britain	July 16, 1925
249,966	Italy	Aug. 27, 1926
312,281	Great Britain	Apr. 17, 1930
782,875	France	June 14, 1935

July 7, 1942. F. C. BEST 2,289,173

MOTOR VEHICLE

Filed Jan. 21, 1939 3 Sheets-Sheet 1

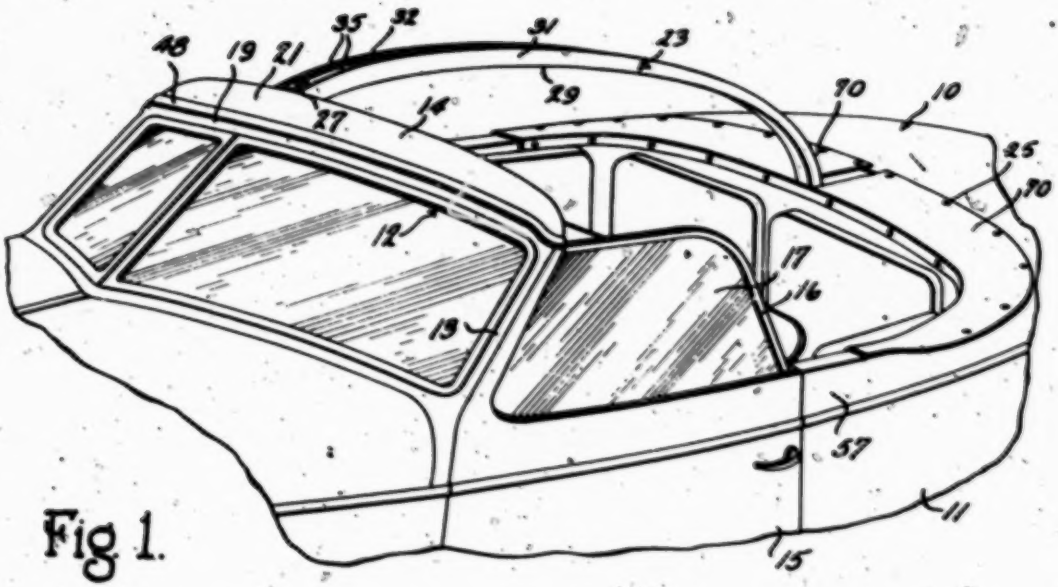
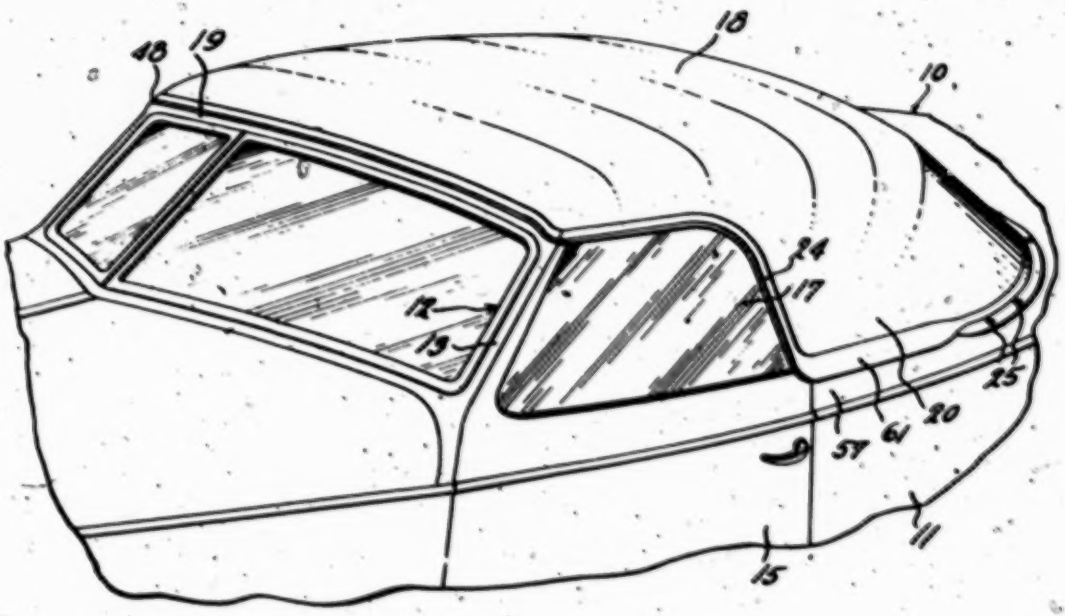


Fig 1.



July 7, 1942. F. C. BEST 2,289,173

MOTOR VEHICLE

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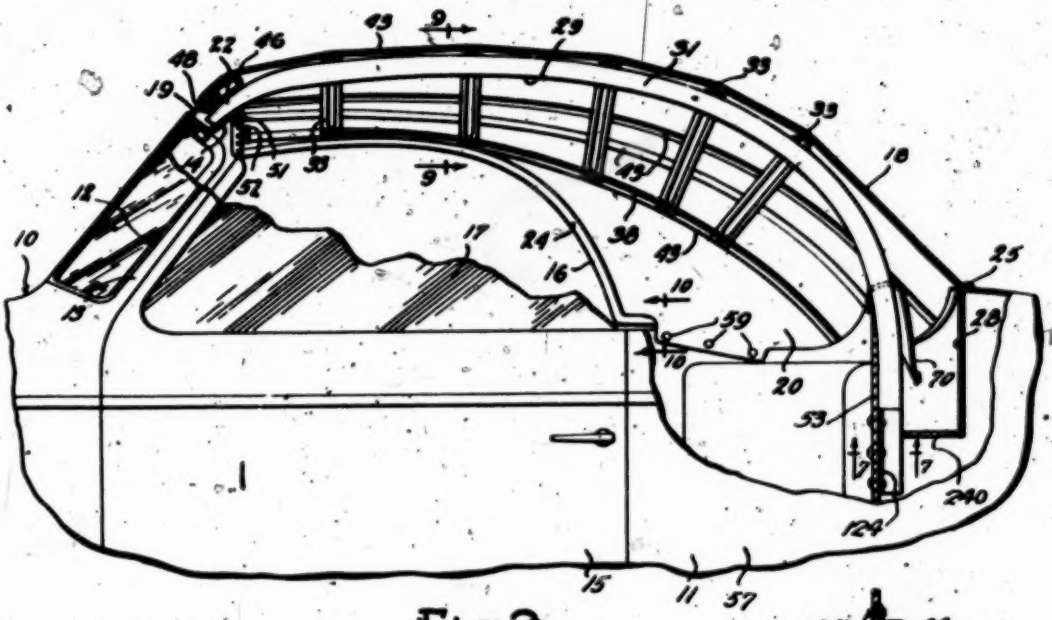

Fig. 3.

Fig. 7.

Fig. 4.

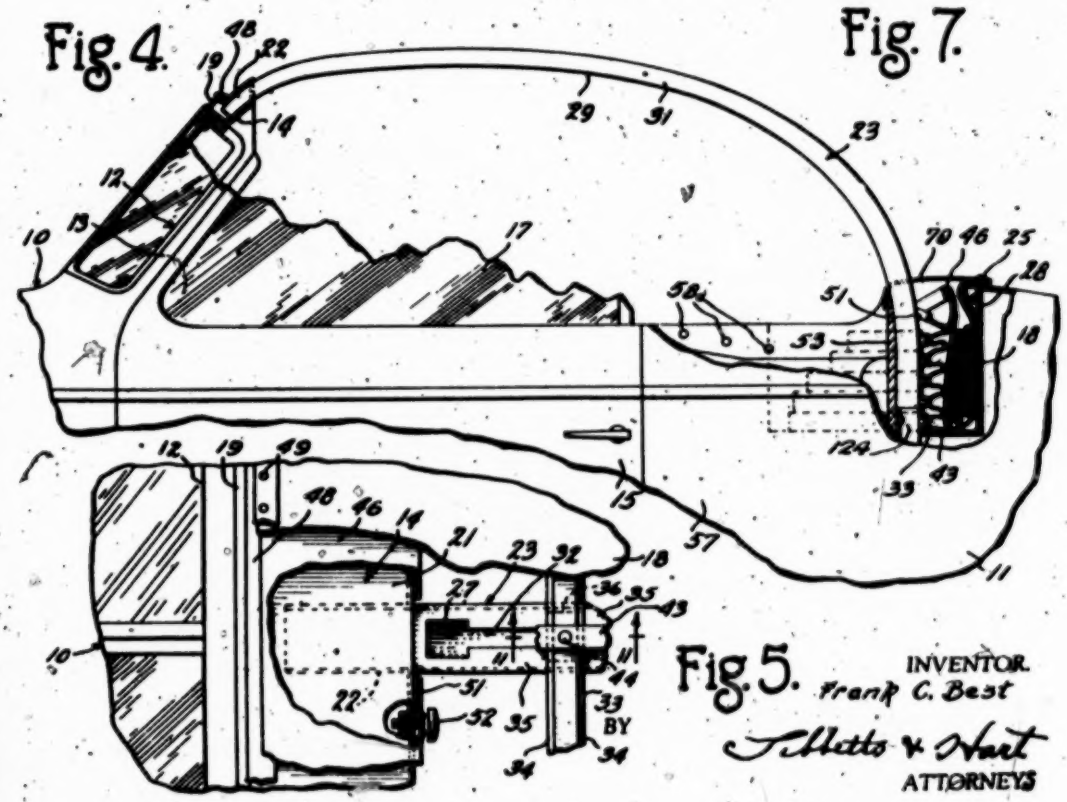

Fig. 5.

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ATTORNEYS

folding of the rear part is directly due to the movement of the hoop 1 and the folding of the front part is due to the drawing of travelling member 17 by the bar 1*a*, which thus pivots the link 15; this causes a sliding of the end of the arm 13 along 1*a* and, by the connecting rod 24, the folding of the joint 21—23, so that the arm 11 will telescope into the arm 13 which latter will gradually come near 1*a* and will be superposed upon the same.

However, it is feasible to employ for the said flaps, as well as for the hoop 1, various mechanical controls, either combinate or separate. The drawings show diagrammatically, by way of example, a control for the movement of the principal hoop 1 by means of an electric motor.

The two ends of the axles 4, one on each side, carry two respective sprocket wheels 28 connected by chains 29 to a common transverse shaft 30 which is driven, through speed-reducing gear, by a small electric motor 31. This latter is provided with a speed-reducing device and with a reversing switch in order to

pivot point of said rear framework, a guiding arm connected to said travelling member, a point of which guiding arm is bound to turn about a fixed point of said support by means of a link or the like, a further arm in sliding engagement with and aligned with said guiding arm, and connecting levers between said further arm and said support whereby said further arm is adapted to slide relatively to said guiding arm upon rotation of said support.

3. A hood as claimed in Claim 2 wherein said connecting levers include a toggle joint, one of the links of which is pivoted to a fixed point of said support and is further preferably connected directly or not to said guiding arm.

4. A hood as claimed in Claim 2 in which the travelling member includes a projection engaged in a slot of said support and connected by a rod to said guiding arm.

5. A hood as claimed in Claim 2 wherein said support is adapted to form the upper part of the rear upright of the

July 7, 1942. F. C. BEST 2,289,173

MOTOR VEHICLE

Filed Jan. 21, 1939 3 Sheets-Sheet 3

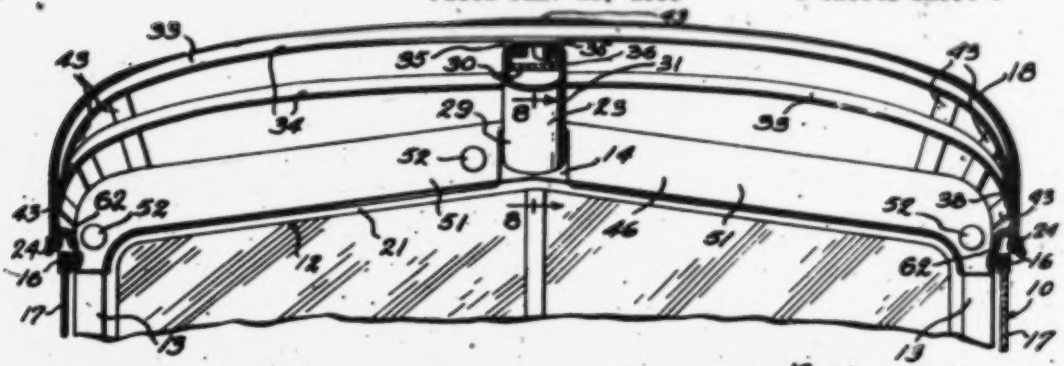

Fig. 6.

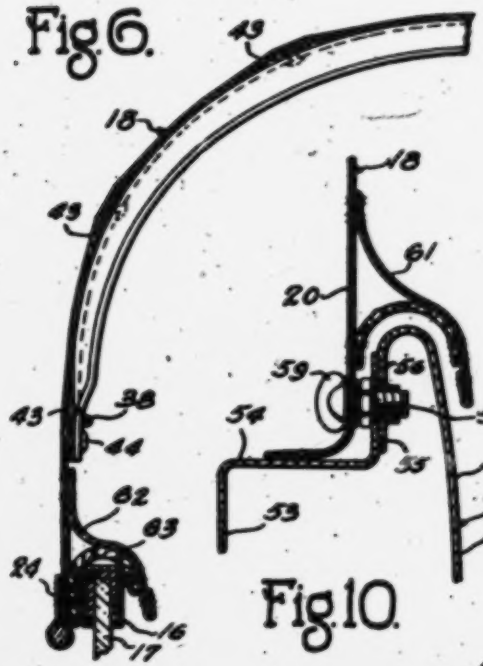

Fig. 9.

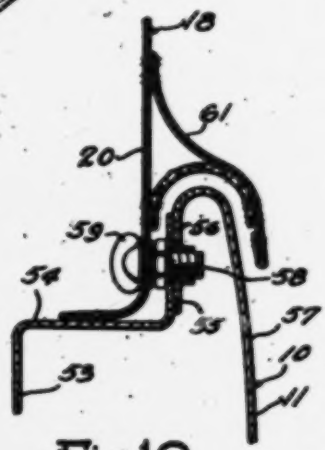

Fig. 10.

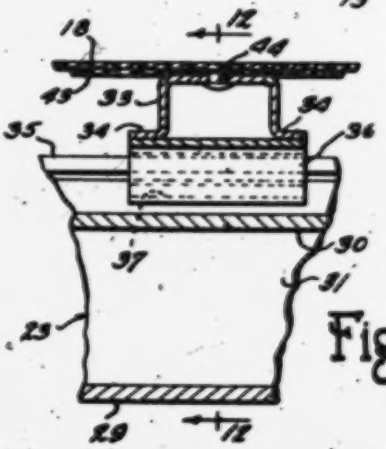

Fig. 11.

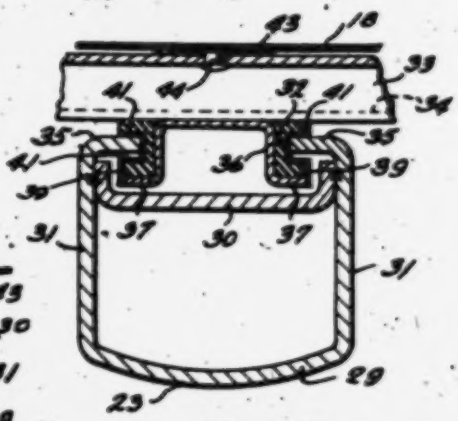

Fig. 12.

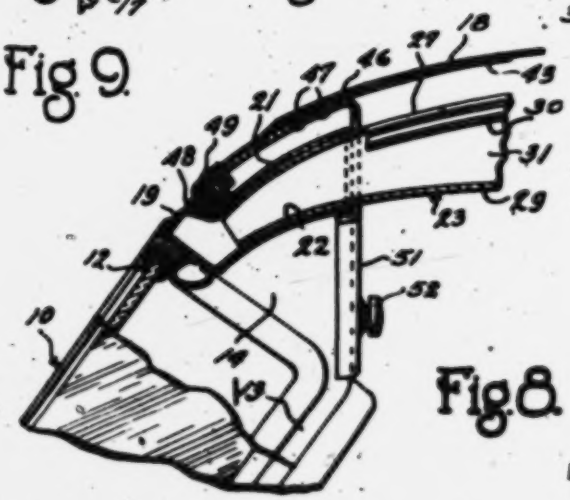

Fig. 8.

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A further object of the invention is to provide an improved folding top so designed as to provide maximum seating capacity particularly in the rear seat, a relatively short and narrow space being provided behind and at the sides of the rear seat to form a booth or compartment for the reception of the top when in the folded or collapsed position.

Yet a still further object of this invention is to provide novel flexible tension members to maintain the foldable portion of the top taut in such a manner that wrinkles are not permitted to form in the top when it is in the elevated or up position, and to maintain the plurality of bows and other top supporting linkage under tension in the up position by securing the tension members to the plurality of bows and linking and anchoring the lower rear end of the tension members to a rigid portion of the body structure proper.

A further object of the invention is to provide an improved separable juncture between the top fabric at its lower forward portion and the inside section of the vehicle illustrated in Fig. 1.

Fig. 3 is a fragmentary side view of the auxiliary bow control and locking mechanism illustrated in Fig. 1.

Fig. 4 is a sectional view taken substantially on a line 4—4 of Fig. 1 looking in direction of the arrows.

Fig. 5 is a fragmentary side view of the main bow control mechanism.

Fig. 6 is a sectional view taken substantially on the line 6—6 of Fig. 1 looking in the direction of the arrows.

Fig. 7 is a view similar to Fig. 3 showing a modified form of the invention permitting the auxiliary bow to be anchored securely to a bow link.

Fig. 8 is a sectional view taken substantially on the line 8—8 of Fig. 7 looking in the direction of the arrows.

Fig. 9 is a fragmentary side view of a portion of the top showing the belt rail.

Fig. 10 is a sectional view taken substantially

or the actuating mechanism moves the main bow carrying members.

An upper power link 36 is secured by means of a pivot 38 to the upper end of the lower power link 26. The opposite end of the upper power link 36 is pivotally secured to an arm 40 carried by the folding pillar 22 as illustrated at 42.

A lower balancing link control member 44 is pivotally mounted to the body as illustrated at 46, and is pivoted to an upper balancing link control member 48 as illustrated at 50. The opposite end of the upper balancing link control member 48 is pivoted at 52 to an arm carried by the folding pillar 22.

A balancing link 54 is pivotally mounted at 56 to an intermediate portion of the lower balancing link control member 44, and is pivoted at its opposite end at 58 to one end of an auxiliary bow control bar 60. The opposite end of the auxiliary bow control bar 60 is pivoted at 62 to an

position as illustrated in dotted lines in Fig. 1.

It will be noted that when the top is moved to the down or collapsed position it folds into a compartment or booth 106 extending across the back and along the sides of the rear seat of the vehicle. A space 108 is provided beneath a portion of the booth or compartment 106 for the reception of a spare wheel and tire 110, a shelf 112 being provided to separate the compartments 106 and 108.

Attention is directed to the fact that when the top is moved to the down position the main bow 30 moves forwardly and upwardly as indicated in Fig. 5 about the pivot 56 as the quadrant 100 is actuated in the top lowering direction. The main bow moves angularly to a predetermined folded position between the rear bow 26 and the pivot 56 in such a manner that the upper portion of the main bow 30 is maintained out of contact with the rear bow 26 and the shelf 112 to pro-

ing of the top mechanism.

Figs. 7 and 8 illustrate a modified form of auxiliary bow actuating mechanism. The auxiliary bow 74 is secured to a bracket 114 having an arm 116 extending in parallel and contacting relation to the auxiliary bow rear link 64 and having a hole or elongated slot 118 for the reception of a boss or pin 119 carried by the link 64.

This type of auxiliary bow controlling mechanism is advantageous in some types of folding tops where it is desirable to maintain the auxiliary bow in a substantially fixed predetermined angular position relative to one of the links 64 or 68. With this construction when the top is moved to the collapsed or down position the auxiliary bow 74 is maintained in substantially the same angular relation relative to the link 64 as it oscillates about the pivot 76 when moving between the up and down positions. With this construction it is necessary that only one of the links 64 or 68 be provided with a slap since the

One desirable form of design includes tension members 134 interposed between the bows and padding 136 or incorporated in the padding 136. One end of each of the tension members is secured to the body of the vehicle as illustrated at 138, and the other end is secured to the front bow 12.

The tension members are preferably provided at spaced points transversely of the top and extend from the front to the rear thereof. The tension members are secured to the rear bow 28, the main bow 60 and the auxiliary bow 74 in such a manner as to insure a predetermined position of each bow relative to the other bows when the top is in the up position. When the top is being elevated the force required to move the top to the taut position is carried through the tension members 134, and it is therefore unnecessary to subject the top material or the padding to tensioning strains that would stretch them out of shape to permit them to loosen up.

nected to the bow extension bracket and connected to the second mentioned bracket at a point spaced from the main pivot, whereby while the pillar is moving to a folding position the quadrant will move the main bow counterclockwise to position the main bow in a predetermined location.

4. In a motor vehicle comprising a body having a substantially vertical inner side wall terminating in a longidudinal belt line; a folding top comprising flexible top material having its lower rear edge secured to said body adjacent said belt line and having forwardly of said rear edge a flap extending within said body to a lower level than the belt line and forming a juncture with said inner wall, means for impeding flow of water past said juncture comprising a flexible weatherstrip secured to said flap and provided with an outwardly extending lateral fin, a folding pillar hinged to said body below said belt line and secured to and exerting forward tension on the lower front portion of said top material so that said fin is pressed against the side wall when the top is in the up position, and a trough within said body so aligned below said juncture

terminating [illegible]
prising flexible top material having its lower rear edge secured to a portion of said body adjacent said belt line and having forwardly of said portion a prolongation of said material extending downwardly within said body, a folding pillar hinged to said body, said material being secured to said pillar, and a cushion associated with said prolongation and inner wall when said top is in raised position and forming a separable weatherproof juncture adjacent said belt line permitting said top being put in lowered position.

9. A vehicle body having an inner side wall terminating in a belt line and a folding top comprising flexible top material having its lower rear edge secured to a portion of said body adjacent said belt line and having forwardly of said portion a prolongation of said material extending downwardly within said body, a folding pillar hinged to said body, said material being secured to said pillar, and a cushion associated with said prolongation and inner wall when said top is in raised position and forming a separable weatherproof juncture adjacent said belt line permitting said top being put in lowered position, said down-

said body in the raised and lowered positions of said top and thus leaving said belt line exposed as viewed from outside said body, the force exerted by the forward pivoting of said pillar being used to close said juncture when said top is in raised position, and a trough within said body to receive leakage of said juncture.

13. In a folding top for a vehicle having a side window, two frame members pivotally connected end-to-end and forming a folding side rail conforming when the top is up to the upper edge of said window, a transverse roof bow normally disposed in a substantially vertical plane and having a downwardly sloping outer portion, a bracket fixed to said bow at a point spaced substantially inwardly from the end of the bow and extending downwardly from said point, a pivot pin carried by said bracket, a link connected to said bracket by said pivot pin and pivotally connected to one of said frame members, a second link pivotally connected to the other of said frame members and pivotally attached to said bracket by said pivot pin, an arm fixedly related to said bracket, and interengaging means on said first link and

and having a rectilinear edge abutting an edge of the other window, a fixed windshield assembly including corner posts and a rearward extension forming the forward portion of a roof, and a top forming the rear portion of the roof and movable to a down position within the rear portion of said lower section and to an up position in abutting relation to said extension to form therewith a generally rectilinear juncture aligned with said edges, said top including side rails and constituting the sole connection above the belt line between said extension and the rear portion of said lower section, said extension forming a support for the forward end of said top when the latter is in up position.

17. In a motor vehicle body of the type having upper and lower sections delimited by a belt line; a door opening in one side of said body, a door therein including a slidable window and a rotatable window located forwardly of the slidable window, said windows having adjacent rectilinear edges, a fixed windshield assembly forming a forward portion of said door opening and including a rearwardly extending header panel shaped to

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2,289,173

UNITED STATES PATENT OFFICE

2,289,173

MOTOR VEHICLE

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Application January 21, 1939, Serial No. 252,139

3 Claims. (Cl. 296—107)

The present invention relates generally to motor vehicles and more particularly to body and top constructions therefor of the type commonly referred to as "convertible" and wherein the top may be raised or lowered to provide either an open or enclosed passenger compartment.

In vehicles of this general character employing a flexible top, the raising and lowering thereof has been a rather difficult and inconvenient operation and it has usually been necessary for the operator to complete the various connecting and securing operations from outside the vehicle, resulting at least, in a disagreeable inconvenience in inclement weather. Fabric or other flexible tops, at present employed, become pinched or wrinkled and require a considerable amount of body space when folded, are inclined to flutter and become noisy when the vehicle is in motion and present an ill-fitting appearance when in raised position. Moreover, in vehicle bodies of this type, it has been a difficult problem to provide a windshield frame of sufficient rigidity without the use of view-obstructing corner posts and headers.

It is therefore one of the objects of the present invention to overcome the objections to present convertible vehicle bodies by the provision of a body and flexible top construction, wherein the top may be easily and quickly raised or lowered and the various connections between the top and body made by one person from within the vehicle, offering full protection to the occupants in inclement weather.

Another object of the invention resides in the provision of a convertible top and vehicle body construction permitting the full use of aerodynamic principles in exterior design, resulting in greater efficiency, a reduction of wind noise, and

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawings in which:

Fig. 1 is a fragmentary perspective view of a motor vehicle employing the present invention and showing the vehicle with the top in lowered position;

Fig. 2 is a view similar to that of Fig. 1, but showing the top in raised position;

Fig. 3 is a fragmentary side view, partly in longitudinal section, of a vehicle incorporating the invention and showing the top in raised position;

Fig. 4 is a view similar to that of Fig. 3, but showing the top in lowered or folded position;

Fig. 5 is a fragmentary top plan view with parts broken away and showing the top supporting rail, the top header and the windshield frame header;

Fig. 6 is a transverse view, partly in section, taken from within the vehicle slightly to the rear of the windshield;

Fig. 7 is a fragmentary sectional view taken on the line 7—7 of Fig. 3;

Fig. 8 is a fragmentary view taken substantially on the line 8—8 of Fig. 6;

Fig. 9 is a sectional view taken substantially on the line 9—9 of Fig. 3;

Fig. 10 is a sectional view taken along the line 10—10 of Fig. 3;

Fig. 11 is a longitudinal sectional view taken on the line 11—11 of Fig. 5, and

Fig. 12 is a sectional view taken on the line 12—12 of Fig. 11.

Referring to the drawings, reference numeral 18 indicates a motor vehicle having a body forming a passenger compartment and provided with

subject to torsional stresses due to the lack of a rigid support above the passenger compartment between the windshield header and the rear of the body. In accordance with the present invention, the windshield header 14 is of substantial size and includes a transversely extending hollow section 18 supported above the windshield glass by the corner posts 13, and a hollow rearwardly extending socket portion 21 opening adjacent the vehicle center line to receive the forward end 22 of a stiff structural bracing element in the form of a rail 23. The supporting rail may extend into the hollow windshield header portion 21 in telescopic relation thereto, and be welded or otherwise secured in fixed position.

In order to present a stream-lined appearance and provide adequate passenger head room, the top supporting rail 23 may extend longitudinally above the passenger compartment in an upward curve and thence downwardly to the rear of the passenger compartment. The rear end of the rail extends into a top receiving well 28 formed in the body outside of the rear portion of the passenger compartment. This well is formed in the body structure by the inner body shell 53, the outer body shell 57 and a wall structure 248. The rail is secured in the well by a bracket 124 fixed to the rear of shell 53 by bolts 126. This construction resists torsional body stresses and lends exceptional rigidity to the open top of the body structure and also to the windshield frame, thus obviating the necessity for large, view-obstructing corner posts.

The supporting rail in the present invention is utilized as a support for the top fabric structure and to this end may be formed as a hollow box section comprising a lower wall 29, a spaced upper wall 30 and spaced integral side walls 31 provided with inturned horizontal flanges above the upper wall 30 forming a longitudinal slot 32, and spaced tracks 35. The top 18 is transversely supported by a series of slightly resilient spaced ribs 33 of channel section having outturned flanges 34 welded or otherwise secured to slidable retainers 36, adapted to enter the slot 32 in the supporting rail 23 and formed with out-turned flanges 37 cooperating with the tracks 35 to slidingly connect the retainers 36 with the supporting rail 23. The retainers may be inserted in the slot 32 through an enlarged portion 27 thereof adjacent the windshield header 14.

Inasmuch as the transverse supporting ribs 33 may be connected to form a radio antenna, as by lead wire 38 soldered thereto, suitable insulating material 39 may be secured to the sides of the retainers 36 and formed to provide grooves to receive metal channels 41 which in turn slidably cooperate with the tracks 35.

When the top is in raised position, the transverse supporting ribs 33 are maintained in proper spaced relation by a series of longitudinally extending web straps 43 suitably secured as by rivets 44 to each of the transverse ribs 33 and to a forward transverse top header 46 as at 47. when the ribs 33 are in slightly sprung position, so that a constant pressure is always exerted upon the top fabric to maintain it in a taut and unwrinkled condition.

In accordance with the invention, provision is made for completing the necessary securing connections between the top and body from inside the vehicle. In the present instance, the top header 46 is formed to overlie a sealing gasket 48 along the forward edge of the windshield header 14 and the forward edge of the top fabric 18 is secured to this header as by rivets 49. The header 46 may be provided with a bifurcated downwardly extending flange 51 adapted to overlie the inner face of the windshield header 14, and is in turn provided with thumb screws 52 to engage threaded openings formed in the windshield header for securing the top 18 in raised position.

Referring particularly to Figs. 9 and 10, the vehicle body comprises the inner body shell 53 having an outwardly extending transverse ledge position 54 formed with an upwardly extending flange 55 to engage the downwardly extending flange 58 of the outer body shell 57 extending above the inner shell. The fixed pins 59 of a series of separable snap fasteners may be secured to the outer shell 57 in spaced relation to each other and positioned to the rear of the vehicle doors 15, and the lower edges of the top panels 20 may extend downwardly below the upper edge of the outer body shell 57 to engage the ledge 54 of the inner body shell 53. The panels 20 may be provided with the movable parts 59 of the snap fasteners, cooperating with the pins 59 to secure the top fabric to the body at these points.

To guard against the entrance of water into the passenger compartment, a yieldable shield 61 is secured to the fabric of the panels 20 slightly above the outer body shell 57 and extends downwardly exteriorly of the body below the top of the outer shell 57. A curved strip of resilient fabric may be connected to extend from the panel 20 over the top of the outer body shell to the shield 61 adjacent the lower edge thereof. In this manner it is impossible for water to enter the passenger compartment at these points.

Similarly, the edges 24 of the fabric top forming the window openings extend inwardly of the window frames 16 beyond the outer peripheries thereof and resilient shields 62 are secured to the fabric and extend over the window frames 16 to the interior of the passenger compartment, a strip of yieldable fabric 63 extending between the fabric top and the shield closely engaging the window frame 16.

For closing the top well 28 when the top is in folded position, a cover 70 may be fixed at its forward edge adjacent the forward edge of the top well and extend across the well to be removably secured at 28.

In operation, assuming the top to be in lowered position, the well cover 70 is unsnapped and the

loosening the above connections and sliding the ribs and top fabric along the longitudinal support into the top well 78 and buttoning the top cover 76 in place.

It will be obvious to those skilled in the art that various modifications in construction and design may be made without departing from the spirit or scope of the invention, which is to be limited only by the appended claims.

What is claimed is:

1. A vehicle body comprising an open top structure, a transversely extending windshield header fixed to the front portion of said structure, a top structural member extending centrally and longitudinally over the open portion of the structure, means fixing the forward end of the top structural member to the windshield header, and means fixing the rear end of the top structural member to the open top structure adjacent the rear end of the open portion thereof.

2. A vehicle body comprising an open top structure, a transversely extending windshield header fixed to the front portion of said structure, a hollow elbow opening toward the rear and fixed to the central portion of said windshield header, a top structural member extending centrally and longitudinally over the open portion of said structure, said top structural member being seated in the rearwardly opening portion of the hollow elbow, and means fixing the rear end of the top structural member to the open top structure adjacent the rear end of the open portion thereof.

3. In a vehicle body, an open top passenger compartment, a windshield frame header at the forward end of the compartment, an open well in the body outside of the rear portion of the passenger compartment, a rigid top structural member extending centrally and longitudinally over the open compartment and projecting into the well, means fixing the forward end of the support member to the windshield frame header, means fixing the rear end of the support member projecting into the well to the body, and a top for the passenger compartment slidably mounted on the top structural member and collapsible into the well.

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Oct. 2, 1951 H. A. MACKIE ET AL 2,569,724

CONVERTIBLE FOLDING TOP WITH AUTOMATIC SEAL AT REAR QUARTER

Filed Aug. 12, 1949 2 Sheets-Sheet 1

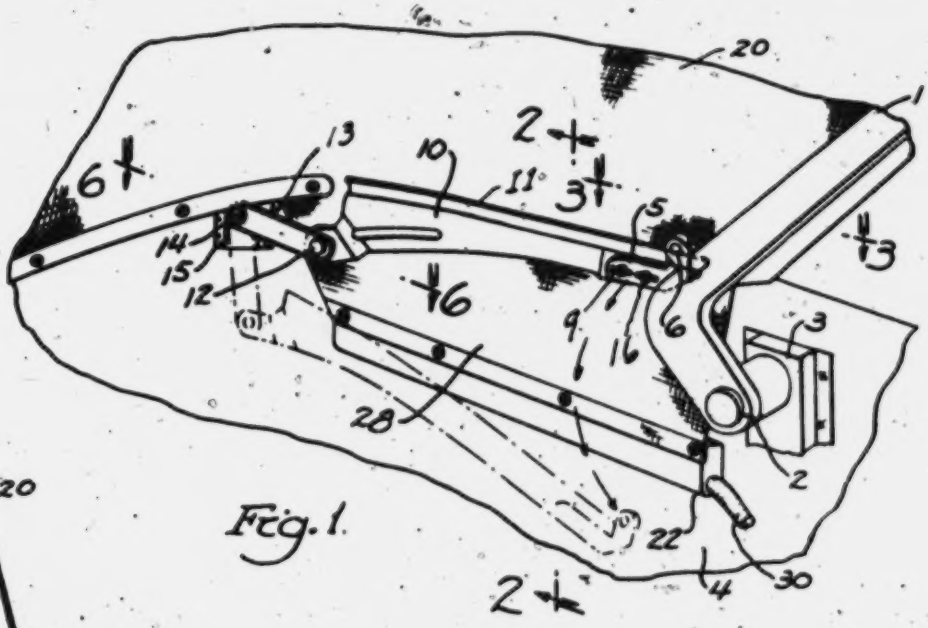

Fig. 1.

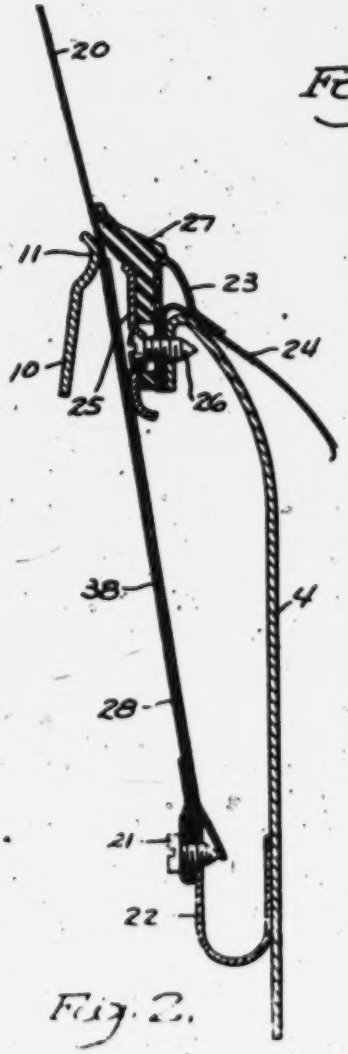

Fig. 2.

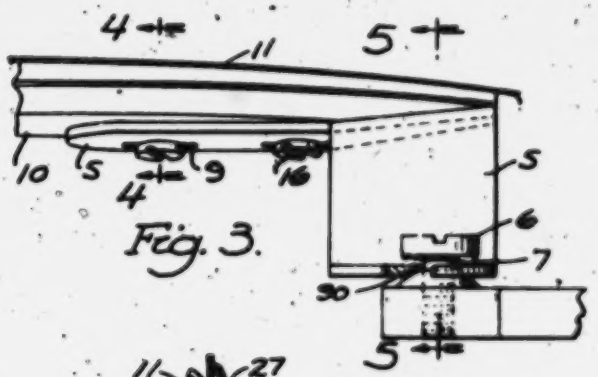

Fig. 3.

Fig. 4.

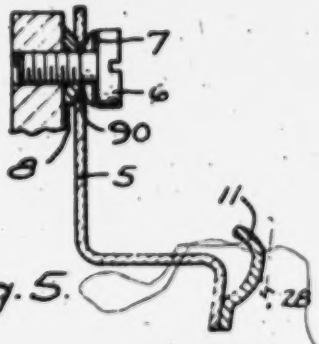

Fig. 5.

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CONVERTIBLE FOLDING TOP WITH AUTOMATIC SEAL AT REAR QUARTER

Filed Aug. 12, 1949 2 Sheets-Sheet 2

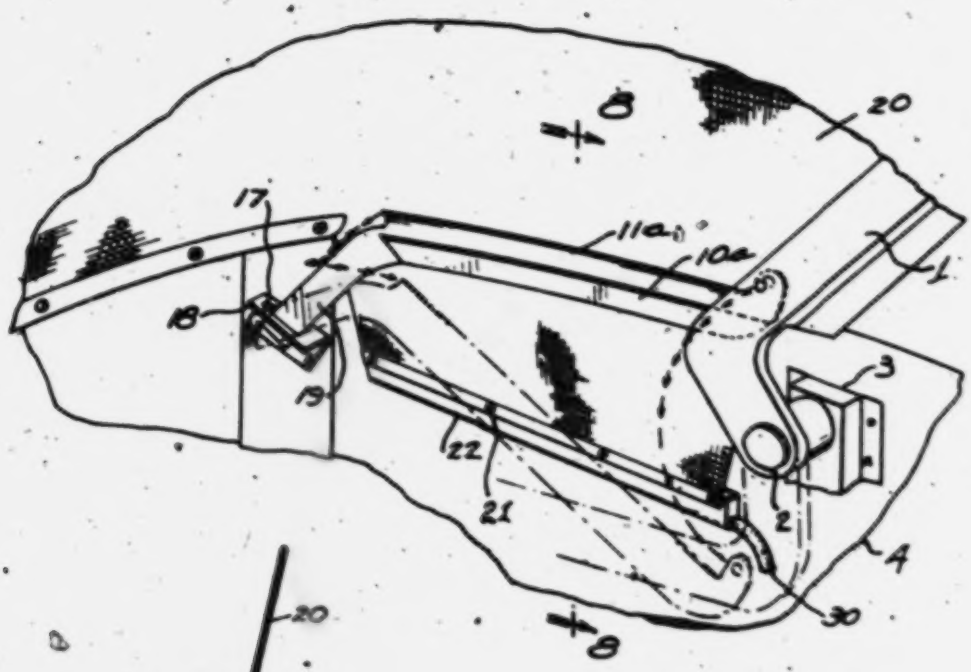

Fig. 7.

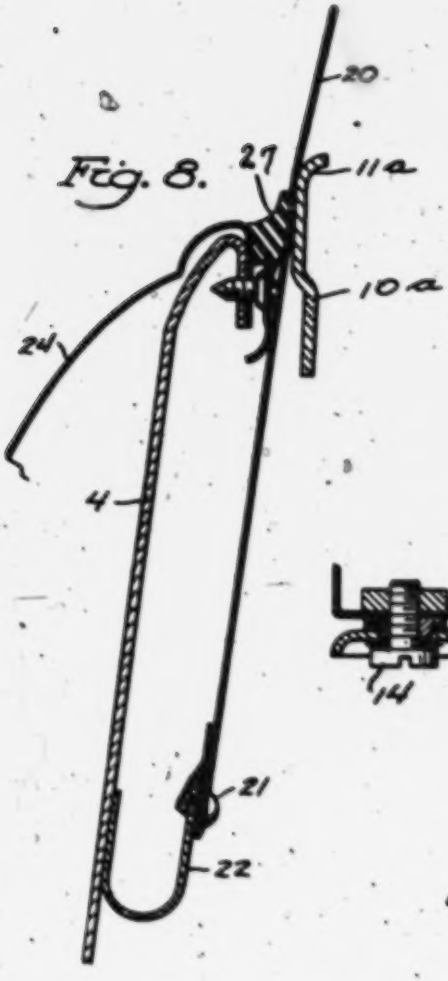

Fig. 8.

Fig. 6.

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Patented Oct. 2, 1951

2,569,724

UNITED STATES PATENT OFFICE

2,569,724

CONVERTIBLE FOLDING TOP WITH AUTOMATIC SEAL AT REAR QUARTER

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Application August 12, 1949, Serial No. 109,974

10 Claims. (Cl. 296—107)

1

This invention relates to automatic sealing for a convertible top. Convertible tops are now fastened along the rear edge permanently to the body or tonneau. At the sides, just to the rear of the rear side window, the fabric has to be releasably fastened to the top of the body or tonneau by means of releasable fastening means. This fastening means may take the form of an inverted dovetail channel strip fastened to the top of the tonneau and extending longitudinally of the body. The foldable top has a stiff flap sewed on the inside. When the top is up this flap has to be tucked under the inverted channel. This has to be done by hand and is quite a chore as very often after the top has been in use for some time it is hard to stretch the top material and hook the flap under the channel. Another form of fastening the top material to the top of the tonneau at the rear quarter is to use a plurality of metal channel strips in which fasteners or studs on the inside of the top may be snapped in place, and the studs will slide out the ends of the channels when the top is folded down. This snapping the fasteners in the channels has to be done by hand after the top is raised. In both these arrangements the top material is automatically disengaged when the top is folded down. However both of these arrangements have the disadvantage that each time the top is raised the top material should be fastened in place at the sides when it has been released and this has to be done by hand. Furthermore the car can never be reliably locked because the top material may be easily pulled away from the top of the tonneau and the arm reached into the body to open the door.

It is the object of our invention to provide an automatic fastening and sealing means at the top and sides of the tonneau of the convertible. This fastening means never has to be operated or touched by the driver of the car. When the top is raised the device automatically goes into action and binds the top material against a sealing strip that is fastened to the top and sides of

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Referring to the drawings:

Fig. 1 is a fragmentary perspective of the inside of the convertible adjacent the rear seat.

Figs. 2, 3, and 6 are sections on the corresponding section lines of Fig. 1.

Figs. 4 and 5 are sections on the corresponding sections lines of Fig. 3.

Fig. 7 is a fragmentary perspective of the inside of a convertible adjacent the rear seat, showing another form of our invention.

Fig. 8 is a section on the line 8—8 of Fig. 7.

1 is the main bow of the folding top which is ordinarily raised and lowered by a power, usually a hydraulic or electric motor. Inasmuch as our improvement would work with a folding top that is raised and lowered by hand power, it is thought unnecessary to show the power means which is no part of the invention.

The main bow 1 is pivoted on a fulcrum pin 2 which is fastened to an anchor 3 which comprises a flanged stamping spot welded to the inside of the folding top compartment panel 4. The main bow has a sheet metal elbow 5 pivoted to it by means of the stud 6. The elbow with an interposed spring lock washer 7 engages over a spherical washer 8. This elbow 5 is fastened through the slots 9 to the toggle arm 10, which has a stamped out longitudinally extending boss 11. Toggle arm 10 is pivoted at the knee by pin 12 to toggle arm 13 which is pivoted by stud 14 to the bracket 15, which in turn is welded to the inside of the tonneau panel. The screws 16 and the slots 9 allow the elbow 5 to be adjusted slightly along the end of the toggle arm 10.

In the form of the structure shown in Fig. 7 the toggle arms are replaced by a single wiping arm 10a which has punched out wiping boss 11a. This wiping arm 10a instead of being guided in its movement by means of the toggle arm 13, as in Fig. 1, is guided by a slot 17 in the bracket 18. The wiping arm 10a has a turned down portion 19 that passes through the slot 17 in the bracket 18 and thereby guides the rear end of the wiping

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strip 26 and the belt molding 23 as plainly shown in Fig. 2.

When the top folds down, the entire top material provided by the section 24 of the top which is below the belt line fastened to the rain trough 22, drops down into the folding top compartment or well. When the top is raised by raising the main bow 1 and the other connected bows (not shown) the material is stretched as shown in Figs. 2 and 3. In the construction shown in Fig. 1, the toggle arms fold up to the near straight line position and the wiping arm 16, with its struck out bow 11, wipes against the top material 24, pressing this firmly against the in-leaning fin of the weather strip, pressing that fin outwardly as shown in both Figs. 2 and 3. This firmly holds the top material against the sealing weather strip 27 and provides a very good fastening means at the top of the tonneau in place of the channel type of fastener described in the preamble. Furthermore, it gives a reliable weather seal by means of pressing the top material 24 tightly against the rubber weather strip. If any water does seep through the connection at this point, it runs down and is caught in the rain trough 22 and is discharged at a separate point by means of the rubber tube 32. A reinforcing material 28 is sewed to the flexible top material to take the rubbing action.

In the form of the invention shown in Figs. 1–6, panels 4 and 24 with their turned over upper edges, together with belt molding 23, form the "belt rail." In the form of the invention shown in Figs. 7 and 8, the turned over edges of panels 4 and 24 form the "belt rail."

What we claim is:

1. In a convertible automobile body, the combination of a lower metal body structure or tonneau having a body panel, a folding bow structure supported by the tonneau and having flexible top material supported by the bows and having the top material at the rear quarter extending down and supported by said panel on the inside and considerably below the top of the metal body or tonneau, a sealing strip of rubber with a leaning-in rubber fin secured to the top of the side of the tonneau at the belt line and arranged to engage the outside of the folding top material when the top is raised, and a wiping arm secured to a bow and operating so that the wiping arm is caused to wipe the inside lower portion of the top material in raising the top and press the top material against the inside of the sealing strip when the top is raised.

2. In a convertible automobile body, the combination of a lower metal body structure or tonneau having a body panel, a folding bow structure supported on the tonneau and having flexible top material supported by the bows and having the top material at the rear quarter extending down and supported by said panel on the inside and considerably below the top of the

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structure supported by the tonneau and having flexible top material supported by the bows and having the top material at the rear quarter extending down and supported by said panel on the inside and below the top of the metal body or tonneau, said top material spreading and adjoining the inside of the top of the side of the tonneau when the bow structure is raised, and an arm secured to a bow and operable simultaneously with the bow to engage the inside lower portion of the top material in raising the folding bow structure and produce a weather seal between the top material and the top of the side of the tonneau.

4. In a convertible automobile body, the combination of a lower metal body structure or tonneau having a body panel, a folding bow structure supported by the tonneau and having flexible top material supported by the bows and having the top material at the rear quarter extending down and fastened to said panel on the inside and below the top of the metal body or tonneau, a portion of said top material spreading and adjoining the inside of the top of the side of the tonneau when the bow structure is raised, a wiping arm attached at one end to a bow and means at the other end of the arm to guide it so that it is caused to wipe the inside lower portion of the top material in raising the top to seal the joint of the top material with the adjoining top of the tonneau.

5. In a convertible automobile body, the combination of a lower metal body structure or tonneau having a body panel, a folding bow structure supported by the tonneau and having flexible top material supported by the bows and having the top material at the rear quarter extending down and secured to said panel on the inside and below the top of the metal body or tonneau, said top material spreading and adjoining the inside of the top of the side of the tonneau when the bow structure is raised, a wiping arm pivoted to a bow, and a guide for the rear end of the wiping arm whereby the wiping arm is caused to wipe the inside lower portion of the top material in raising the top to engage the top material and urge it toward the adjoining portion of the tonneau and thereby provide a watertight seal between said top material and said tonneau.

6. In a convertible automobile body, the combination of a lower metal body structure or tonneau having a body panel, a folding bow structure supported by the tonneau and having flexible top material supported by the bows and having the top material at the rear quarter extending down and secured to said panel on the inside and below the top of the metal body or tonneau, said flexible top material spreading and adjoining the inside of the top of the side of the tonneau when the bow structure is raised, a wiping arm attached to a bow and caused to wipe the inside lower portion of the top material and grip

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flexible top material spreading and adjoining the inside of the top of the side of the tonneau when the bow structure is raised, a wiping arm pivoted to a bow and caused to engage the top material when the top is raised to weather seal the joint between the two said adjoining elements, and means for guiding the rear end of the wiping arm comprising a swinging link or toggle arm pivoted to the rear end of the wiping arm and to the tonneau.

8. In a convertible automobile body, the combination of a lower metal body structure or tonneau having a body panel, a folding bow structure supported by the tonneau and having flexible top material supported by the bows and having the top material at the rear quarter extending down, a rain trough secured to the bottom of said flexible top material and to said panel on the inside and below the top of the metal body or tonneau, said flexible top material spreading and adjoining the inside of the top of the side of the tonneau when the bow structure is raised, and a wiping arm secured to a part of the movable bow structure and acting simultaneously with said bow structure to engage the inside lower portion of the top material in raising the top to press the two adjoining members toward each other and thereby produce a weather seal therebetween.

9. In a convertible automobile body, the combination of a lower metal body structure or tonneau having a body panel, a folding bow structure supported by the tonneau and having flexible top material supported by the bows and having the top material at the rear quarter extending down and secured to said panel on the inside and below the top of the metal body or tonneau, said top material spreading and adjoining the top of the side of the tonneau when the bow

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structure is raised, and a wiping arm provided with a punched out wiping boss attached to a part of the bow structure and guided at its other end to cause it to wipe the top material in raising the top and seal the joint between the top material and the top of the tonneau.

10. In a convertible automobile body, a fixed side wall member having at the top a belt rail, a swinging main bow mounted on said wall member, a collapsible top movable with the bow between raised and lowered positions and including at the rear quarter foldable top material fastened at its lower end to the side wall member below the belt rail and arranged when the bow is raised to extend upwardly beside the belt rail and beyond the same, a deformable element effective to afford a weatherproof seal positioned between the adjoining surfaces of the belt rail and the foldable top material when the bow is raised, and a pressure arm movably connected with the bow for cooperative relation with the belt rail to squeeze the deformable element therebetween for a tight joint.

HARRY A. MACKIE.
STANLEY DULUK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,809,506	Campbell	June 9, 1931

FOREIGN PATENTS

Number	Country	Date
564,361	Great Britain	Sept. 25, 1944

serted in the slot 32 through an enlarged portion 27 thereof adjacent the windshield header 14.

Inasmuch as the transverse supporting ribs 33 may be connected to form a radio antenna, as by lead wire 38 soldered thereto, suitable insulating material 39 may be secured to the sides of the retainers 36 and formed to provide grooves to receive metal channels 41 which in turn slidably cooperate with the tracks 35.

When the top is in raised position, the transverse supporting ribs 33 are maintained in proper spaced relation by a series of longitudinally extending web straps 43 suitably secured as by rivets 44 to each of the transverse ribs 33 and to a forward transverse top header 46 as at 47, and secured at their opposite ends, with the rear edge of the top fabric 18, to the rear deck of the body adjacent the top well 28, as at 28. When the top is in raised position, some of the spacer straps 43 being secured adjacent the ends of the transverse supporting ribs 33 and being secured between the vehicle body at the rear and the top header 46 at their forward ends, the spacer straps are pulled tightly to exert pressure on the ends of the bowed ribs 33 springing them slightly inwardly. The top fabric may be fitted

window frames 16 beyond the outer peripheries thereof and resiliant shields 62 are secured to the fabric and extend over the window frames 16 to the interior of the passenger compartment, a strip of yieldable fabric 63 extending between the fabric top and the shield closely engaging the window frame 16.

For closing the top well 28 when the top is in folded position, a cover 70 may be fixed at its forward edge adjacent the forward edge of the top well and extend across the well to be removably secured at 28.

In operation, assuming the top to be in lowered position, the well cover 70 is unsnapped and the operator grasps the top header 46 sliding it along the supporting rail 23 to the windshield header 14 where the forward edge thereof engages the sealing molding 48. As the top header 46 moves forwardly, it carries with it the top fabric 18, the transverse supporting ribs 33 and the spacer straps 43. The thumb screws 52 between the headers 14 and 46 and the snap fastener connections 58—59 between the top side panels 20 and the body may be completed by the operator at his leisure from within the passenger compartment. The top may be lowered by simply

top material around the rearward ... sides when it has been released and this has to be done by hand. Furthermore the car can never be reliably locked because the top material may be easily pulled away from the top of the tonneau and the arm reached into the body to open the door.

It is the object of our invention to provide an automatic fastening and sealing means at the top and sides of the tonneau of the convertible. This fastening means never has to be operated or touched by the driver of the car. When the top is raised the device automatically goes into action and binds the top material against a sealing strip that is fastened to the top and sides of the tonneau. Hence three advantages are derived from this structure over what has been the prevailing practice. First, the device is automatic in its operation and requires no human interposition. Second, the device weatherseals as well as fastens the material to the top of the tonneau in a way that is not afforded by previous structures, and third, the material is locked in place so that it is not possible to release it to reach into the interior of the car to unlatch the doors.

12 to toggle arm 13 which is pivoted by stud 14 to the bracket 15, which in turn is welded to the inside of the tonneau panel. The screws 16 and the slots 9 allow the elbow 5 to be adjusted slightly along the end of the toggle arm 13.

In the form of the structure shown in Fig. 7 the toggle arms are replaced by a single wiping arm 18a which has punched out wiping boss 11a. This wiping arm 18a instead of being guided in its movement by means of the toggle arm 13, as in Fig. 1, is guided by a slot 17 in the bracket 18. The wiping arm 18a has a turned down portion 19 that passes through the slot 17 in the bracket 18 and thereby guides the rear end of the wiping arm when it is thrown up or down—the latter position shown in dotted lines in Fig. 7.

The top fabric or material 20 is permanently fastened by rivets 21 to the rain trough 22 which in turn is spot welded to the folding top compartment panel 4. Belt molding 23 loops over the top of the rear quarter panel 24, and this and a retaining strip 25 are fastened to the looped under top edge of the folding top compartment panel 4 by means of the screws 26. The finned weatherstrip 27 is held in between the retaining

of the side of the tonneau at the belt line and arranged to engage the outside of the folding top material when the top is raised, and a wiping arm secured to a bow and operating so that the wiping arm is caused to wipe the inside lower portion of the top material in raising the top and press the top material against the inside of the sealing strip when the top is raised.

2. In a convertible automobile body, the combination of a lower metal body structure or tonneau having a body panel, a folding bow structure supported on the tonneau and having flexible top material supported by the bows and having the top material at the rear quarter extending down and supported by said panel on the inside and considerably below the top of the metal body or tonneau, a sealing strip secured to the top of the side of the tonneau at the belt line and arranged to engage the outside of the folding top material when the top is raised, a swinging wiping arm pivoted to and actuated by part of the bow structure, and means for guiding the arm so that it is caused to wipe the inside lower portion of the top material in raising the top and press the top material against the inside of the sealing strip when the top is raised.

3. In a convertible automobile body, the combination of a lower metal body structure or tonneau having a body panel, a folding bow structure supported by the tonneau and having flexible top material supported by the bows and having the top material at the rear quarter extending down and secured to said panel on the inside and below the top of the metal body or tonneau, said flexible top material spreading and adjoining the inside of the top of the side of the tonneau when the bow structure is raised, a wiping arm attached to a bow and caused to wipe the inside lower portion of the top material and grip the top material when the top is raised, and means for guiding the rear end of the wiping arm comprising a slotted bracket secured to the tonneau and through which the rear end of the wiping arm passes.

4. In a convertible automobile body, the combination of a lower metal body structure or tonneau having a body panel, a folding bow structure supported by the tonneau and having flexible top material supported by the bows and having the top material at the rear quarter extending down and secured to said panel on the inside and below the top of the metal body or tonneau, said flexible top material spreading and adjoining the inside of the top of the side of the tonneau when the bow structure is raised, a wiping arm attached to a bow and caused to wipe the inside lower portion of the top material and grip the top material when the top is raised, and means for guiding the rear end of the wiping arm comprising a slotted bracket secured to the tonneau and through which the rear end of the wiping arm passes, said bracket having a portion to engage the inside of the tonneau and a portion to engage the outside of the tonneau.

5. In a convertible automobile body, the combination of a lower metal body structure or tonneau having a body panel, a folding bow structure supported by the tonneau and having flexible top material supported by the bows and having the top material at the rear quarter extending down and secured to said panel on the inside and below the top of the metal body or tonneau, said flexible top material spreading and adjoining the inside of the top of the side of the tonneau when the bow structure is raised, a wiping arm attached to a bow and caused to wipe the inside lower portion of the top material and grip the top material when the top is raised, and means for guiding the rear end of the wiping arm comprising a slotted bracket secured to the tonneau and through which the rear end of the wiping arm passes, said bracket having a portion to engage the inside of the tonneau and a portion to engage the outside of the tonneau and arranged to wipe the top material against the adjoining portion of the tonneau and thereby provide a watertight seal between said top material and said tonneau.

6. In a convertible automobile body, the combination of a lower metal body structure or tonneau having a body panel, a folding bow structure supported by the tonneau and having flexible top material supported by the bows and having the top material at the rear quarter extending down and secured to said panel on the inside and below the top of the metal body or tonneau, said flexible top material spreading and adjoining the inside of the top of the side of the tonneau when the bow structure is raised, a wiping arm attached to a bow and caused to wipe the inside lower portion of the top material and grip the top material when the top is raised, and means for guiding the rear end of the wiping arm comprising a slotted bracket secured to the tonneau and through which the rear end of the wiping arm passes.

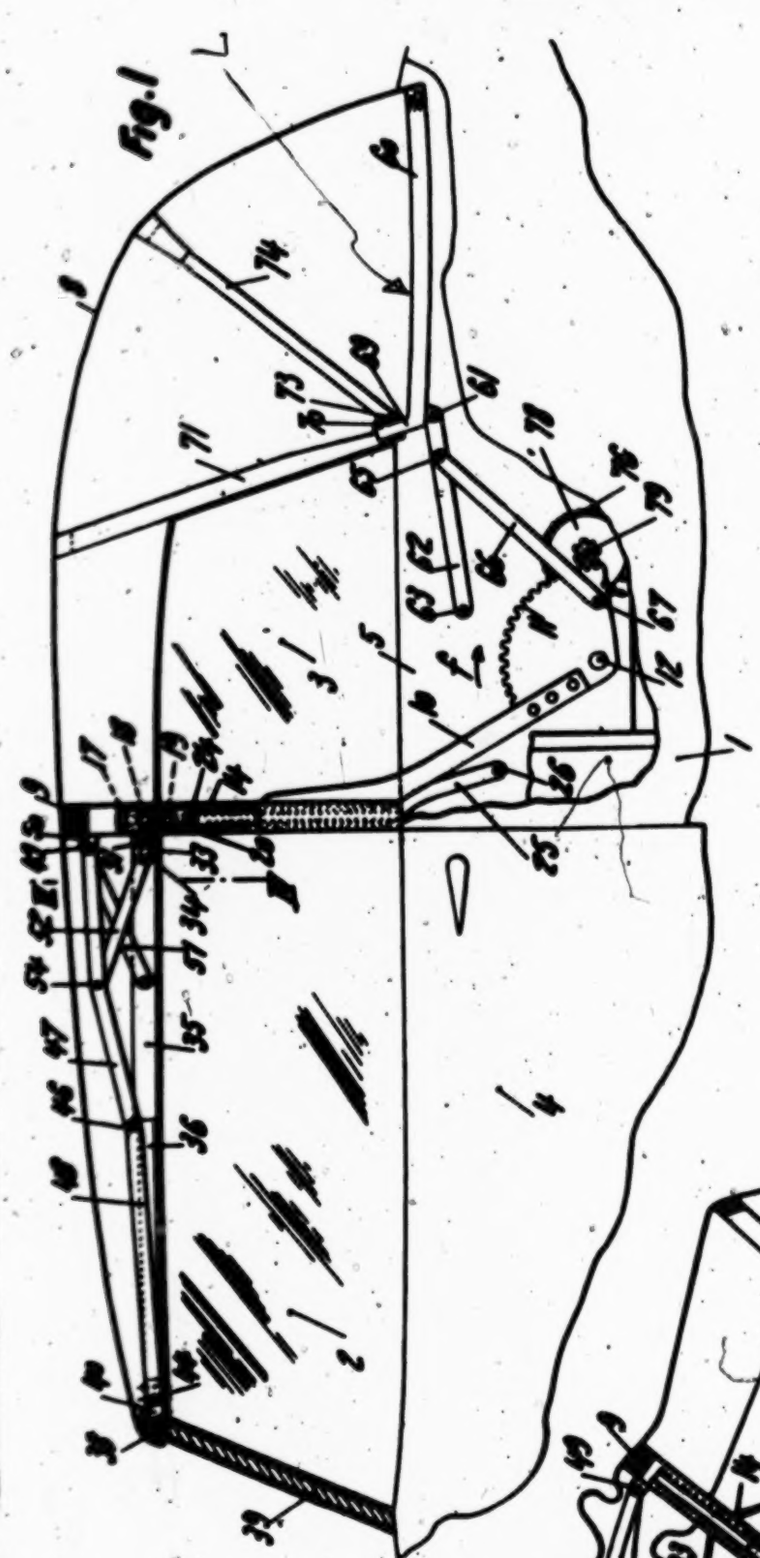
7. In a convertible automobile body, the combination of a lower metal body structure or tonneau having a body panel, a folding bow structure supported by the tonneau and having flexible top material supported by the bows and having the top material at the rear quarter extending down and secured to said panel on the inside and below the top of the metal body or tonneau, said

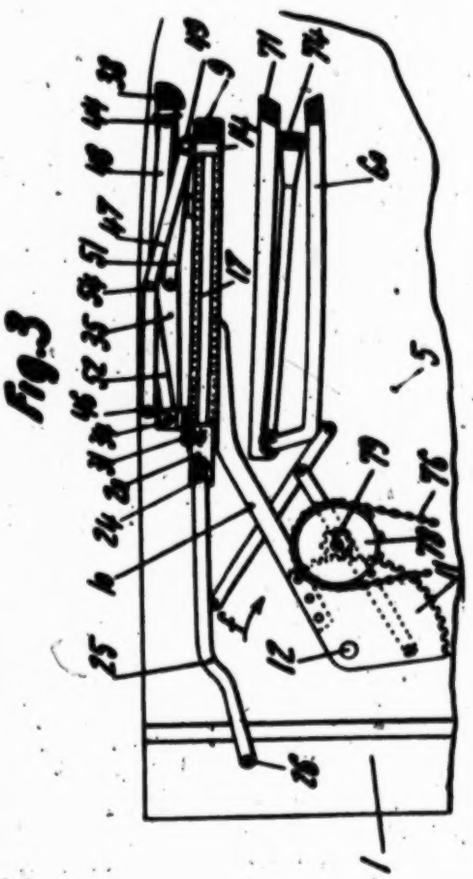
DEFENDANTS' EXHIBIT NN

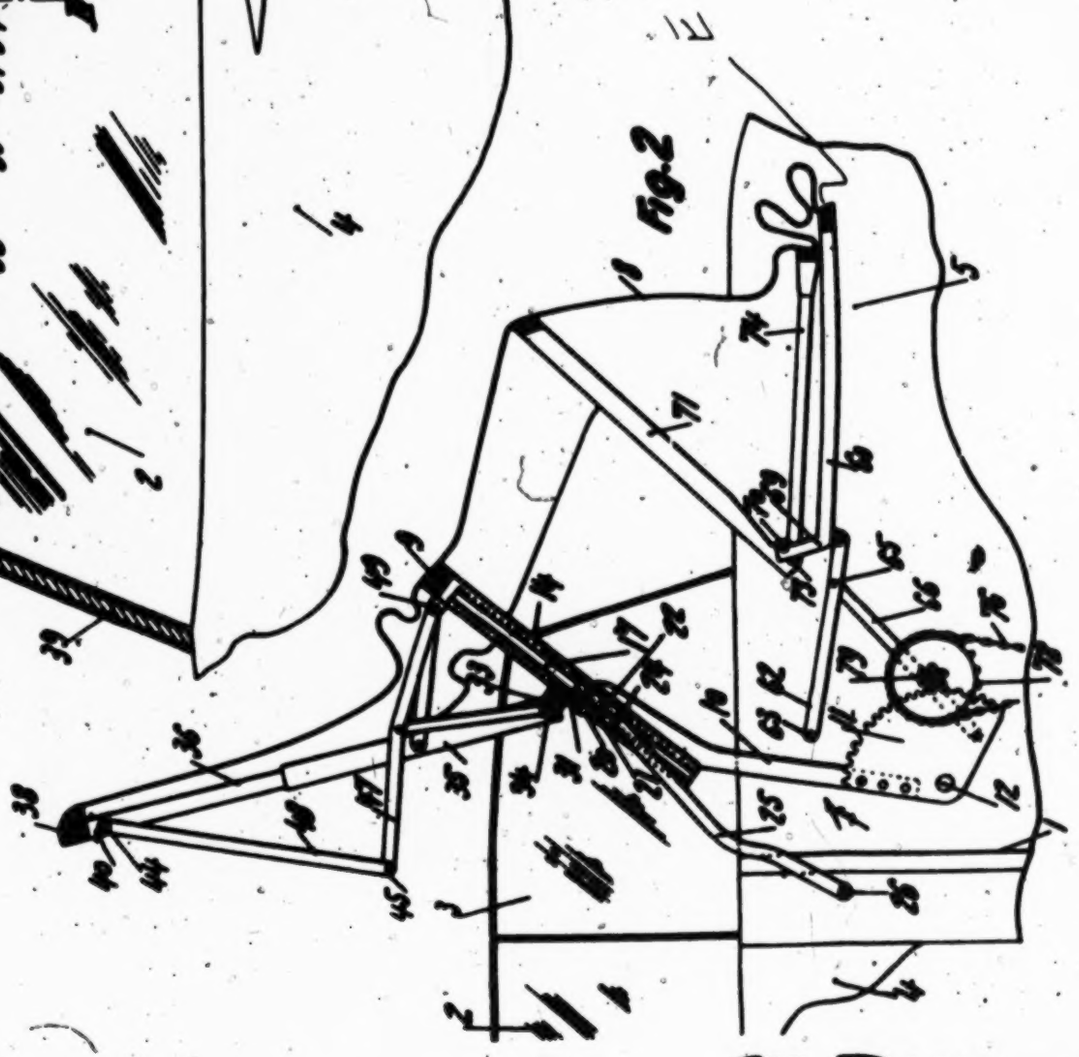
May 9, 1939. M. BESSONNEAU 2,157,783

FOLDING HOOD FOR AUTOMOBILE VEHICLES OR THE LIKE

Filed Nov. 16, 1938 3 Sheets-Sheet 1







M. Bessonneau
Inventor

By: Glascock Downing & Seibold
Attys.

7,641 COMPLETE SPECIFICATION

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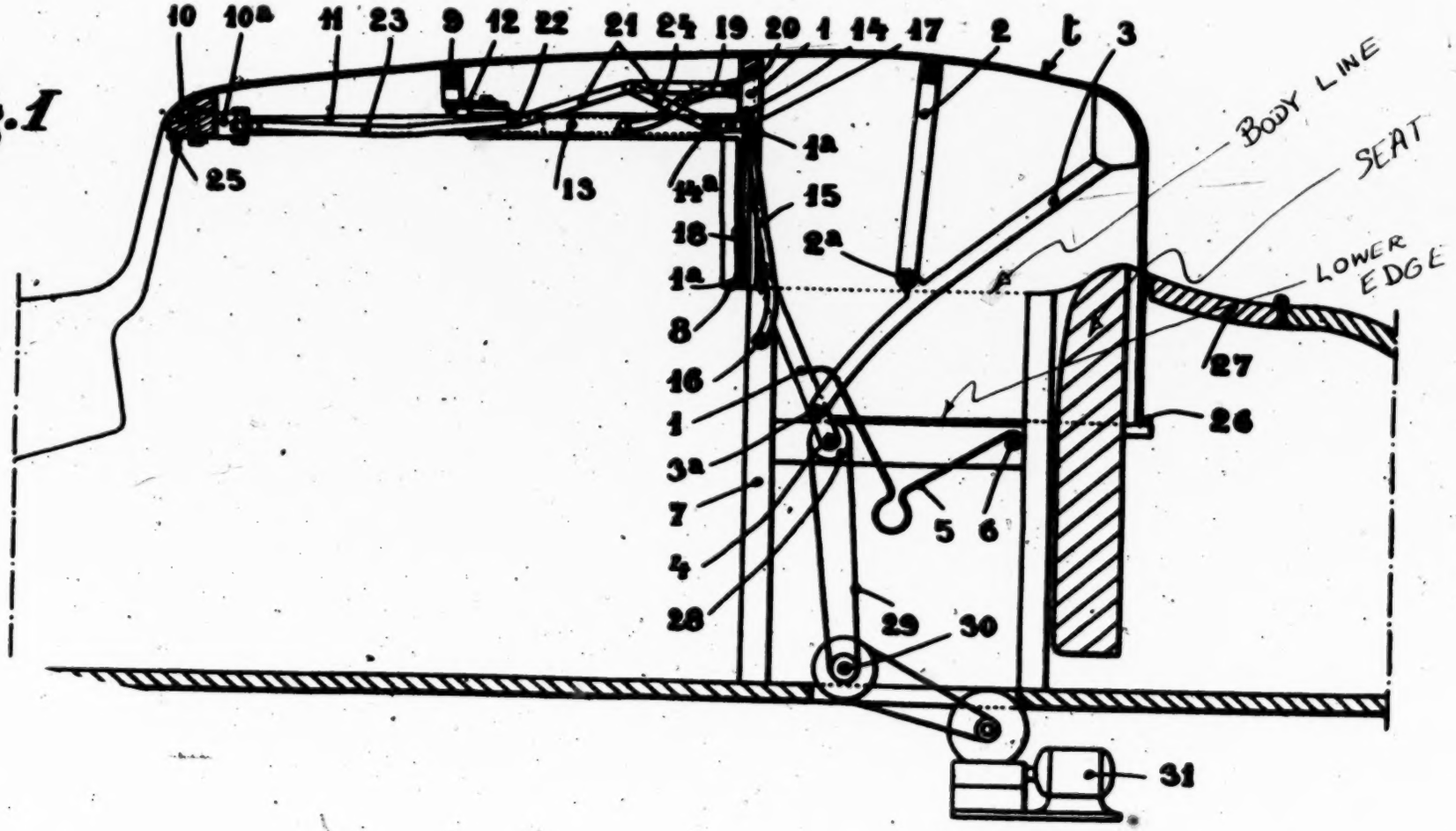
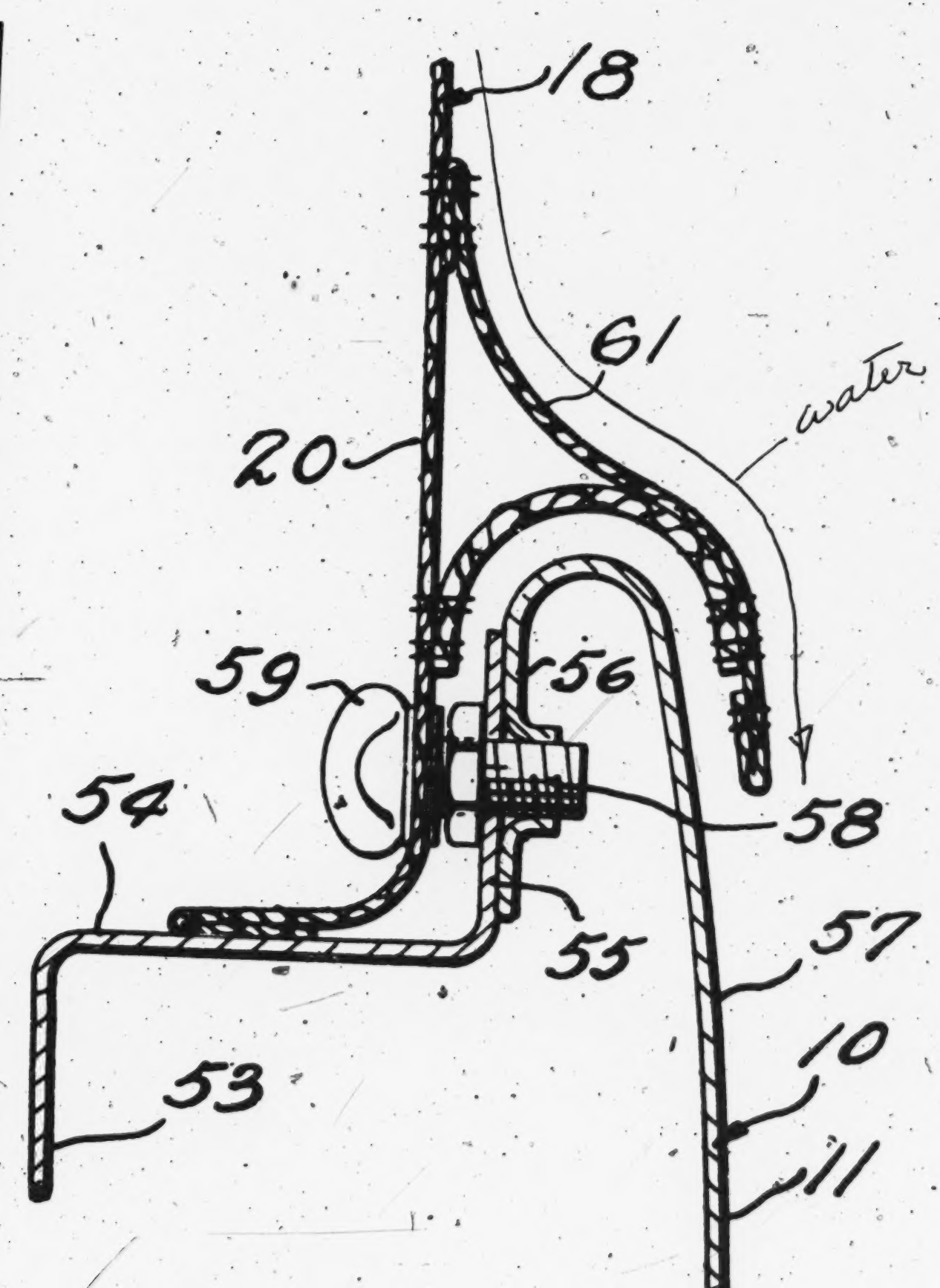
57-357

Fig. 1

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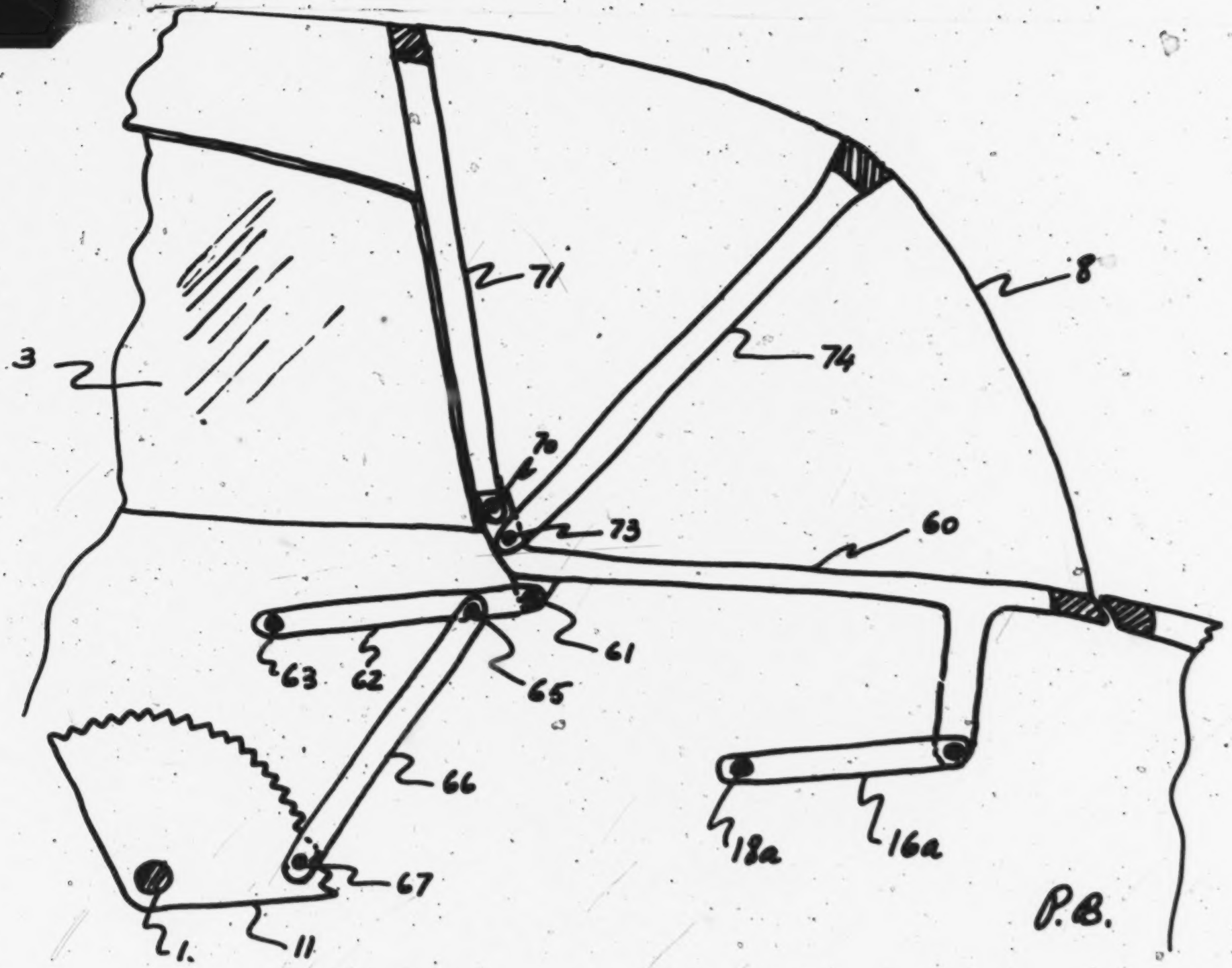
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P.B.

WRIGHT DEPOSITION EXHIBIT 4

LICENSE AGREEMENT

This agreement is effective on the day of the last signature hereto, between AUTOMOBILE BODY RESEARCH CORP. (hereinafter referred to as AB), a corporation of Maryland, and ATLAS INTERNATIONAL Co. of Chicago, a partnership, located at 1545 N. Fairfield Avenue, Chicago, Illinois (hereinafter referred to as Licensee).

WHEREAS, AB is the owner of United States Letters Patent 2,549,153, together with all rights for past infringement thereof, and United States Letters Patent 2,569,724, together with all rights for past infringement thereof since December 31, 1953; and

WHEREAS, Licensee desires a release for past infringement of said patents and a license for the future;

NOW, THEREFORE, the parties agree as follows:

1. AB licenses the Licensee to make, sell, and use devices under its United States Patents Nos. 2,549,153 and 2,569,724.

2. Licensee will pay a royalty on any replacement top (made, used or sold by Licensee), without regard to whether such top is covered by either of said patents, which by its peculiar shape or other construction adapts it for use on any one or more of the following cars:

a. Buick	1950 to 1955 inclusive
b. Cadillac	1950 to 1955 inclusive
c. Chevrolet	1950 to 1954 inclusive
d. Chrysler	1953
e. De Soto	1953
f. Dodge	1953
g. Ford	1952 to 1954 inclusive
h. Lincoln	1952 to 1955 inclusive
i. Mercury	1952 to 1954 inclusive

j. Oldsmobile 1950 to 1955 inclusive
k. Plymouth 1953
l. Pontiac 1950 to 1954 inclusive
m. Any model of car after the 1955 model where the manufacturer of the car marks one or more of the above patent numbers on new cars of that model or pays royalty on the replacement top fabrics that it sells for that model.

3. In event Licensee makes, uses or sells any device (including replacement tops) not falling under the preceding paragraph, royalty is to be paid if the Licensee's conduct respecting such device would, in the absence of the patentee's consent, amount to an infringement (including contributory) of one or more of said patents. In determining the coverage of either patent, its claims read in the light of its specification, and the prior art of record in its file wrapper shall measure the scope of the patent.

4. In event Licensee sells its products through another person, firm, company or corporation (to members of the public, wholesalers, stores, dealers, or other customers), and if such other person, firm, company or corporation, is owned, managed, or controlled by any person or persons, firm, company or corporation, that manage or control Licensee, or by a relative (either by blood or marriage) of the person or persons who control Licensee, the royalty base shall be the highest sale price of any of the persons, firms, companies, or corporations involved. This provision is included in this agreement since it is the practice of some members of the replacement top industry to have separate concerns for manufacturing and selling, whereas it is the practice of other members of the industry to have a single concern for both manufacturing and selling. This provision is intended to equalize the royalties.

5. If the number of licensed devices sold in any quarter

is less than 400, the royalty shall be at the rate of 5%. If over 400 licensed devices are sold in any one quarter, the royalty is computed by aggregating the selling prices (using the base price for each unit as determined by the preceding paragraph), and dividing by the number of devices sold to ascertain the average selling base price. The royalty shall be 5% of this average base price for each of the first 400 devices sold and 3% of this average base price for each device sold in excess of 400. Thus, if Licensee sold 400 devices for $15.00 and 400 at $25.00 during a given quarter, the total royalty would be $640.00. In event devices are leased or used without being sold, royalty will be paid using the average selling price as a base. For the purposes of this agreement, the selling price of a licensed device shall be the invoice price to a customer including excise taxes but less freight allowances and discounts; and less 25% of the invoice price as an allowance for the rear curtain in the case of tops sold with rear curtains and less than $1.25 as an allowance for trim in the case of tops sold with trim, provided that in no case shall the royalty be based on a selling price of a replacement top alone be less than 75% of the selling price of the same top complete with rear curtain. A device shall be considered sold when it is invoiced, provided that Licensee shall be entitled to credit for returned devices and for devices written off as bad debts.

6. In order to enable AB to keep count of the number of replacement tops sold by the Licensee, AB will furnish Licensee with serially numbered printed patent notices. There will be three forms of notices respectively reading as follows:

(a) "This replacement top licensed under U. S. Patent No. 2,549,153."

(b) "This replacement top licensed under U. S. Patent No. 2,569,724."

(c) "This replacement top licensed under U. S. Patents 2,549,153 and 2,569,724."

Licensee will attach the appropriate one of these notices, as specified by AB, to each replacement top covered by a patent, and will be responsible for each serially numbered notice furnished to it, and must pay royalty on at least as many replacement tops as it has received notices that remain unaccounted for by use, inventory, returns, bad debts or accidental destruction, plus royalty on any devices sold without such notice but on which royalty is due.

7. Royalty reports will be rendered quarterly during the months of January, April, July and October, covering Licensee's activities during the preceding quarters. For example, the April report will cover sales made from January 1, to March 31. Each royalty report will include:

(a) The total number of licensed devices sold and the total selling price thereof.

(b) The number of licensed devices leased or used but not sold.

(c) The report for the last quarter of each year shall additionally include the number of serially numbered patent notices received during the year and the number unused, remaining in inventory, on returned devices and accounted for by bad debts or accidental destruction.

Licensee shall pay to AB the amount of royalty shown to be due by each report within thirty (30) days of the date of the report.

8. Licensee agrees to keep adequate accurate records that will enable AB to determine the royalty due hereunder and to allow a representative of AB to audit the same at least once a year. The records are to be preserved for a period equal to the statute of limitations in Licensee's state.

9. In event Licensee sells to a third party who is also a licensee of AB, the present license agreement shall not apply nor will royalties be payable hereunder, and nothing herein shall constitute a waiver of AB's right to recover royalties from said third party under its license.

10. In event the parties have a dispute over the amount of unpaid royalty due to AB, either may call upon the Chief Judge of the U. S. District Court, for Maryland to appoint an arbitrator whose decision shall be binding.

11. Licensee agrees to report and pay AB for any royalty due for devices sold between the effective date of this agreement and the date of the last signature hereto within thirty days following the latter date.

12. In consideration of $1.00, payable by Licensee to AB within sixty (60) days from the date hereof, AB releases Licensee and its customers of any claim for infringement arising prior to the effective date of this agreement, provided that this agreement shall run continuously for at least one year and royalties be fully paid thereunder.

13. So long as Licensee renders full and accurate royalty reports and has made payments as they come due, it may terminate this agreement by giving written notice of termination concurrently with a timely royalty report and payment in which event the license will terminate with the end of the next royalty period.

14. In event Licensee adopts a selling procedure which is different from the selling procedures followed by other licensees of AB and which results in a lower effective royalty base for Licensee, then AB may require Licensee to pay such additional royalty as necessary to correct the inequality.

15. AB may terminate this license in event of a breach of the license terms, which is not corrected after thirty (30) days notice.

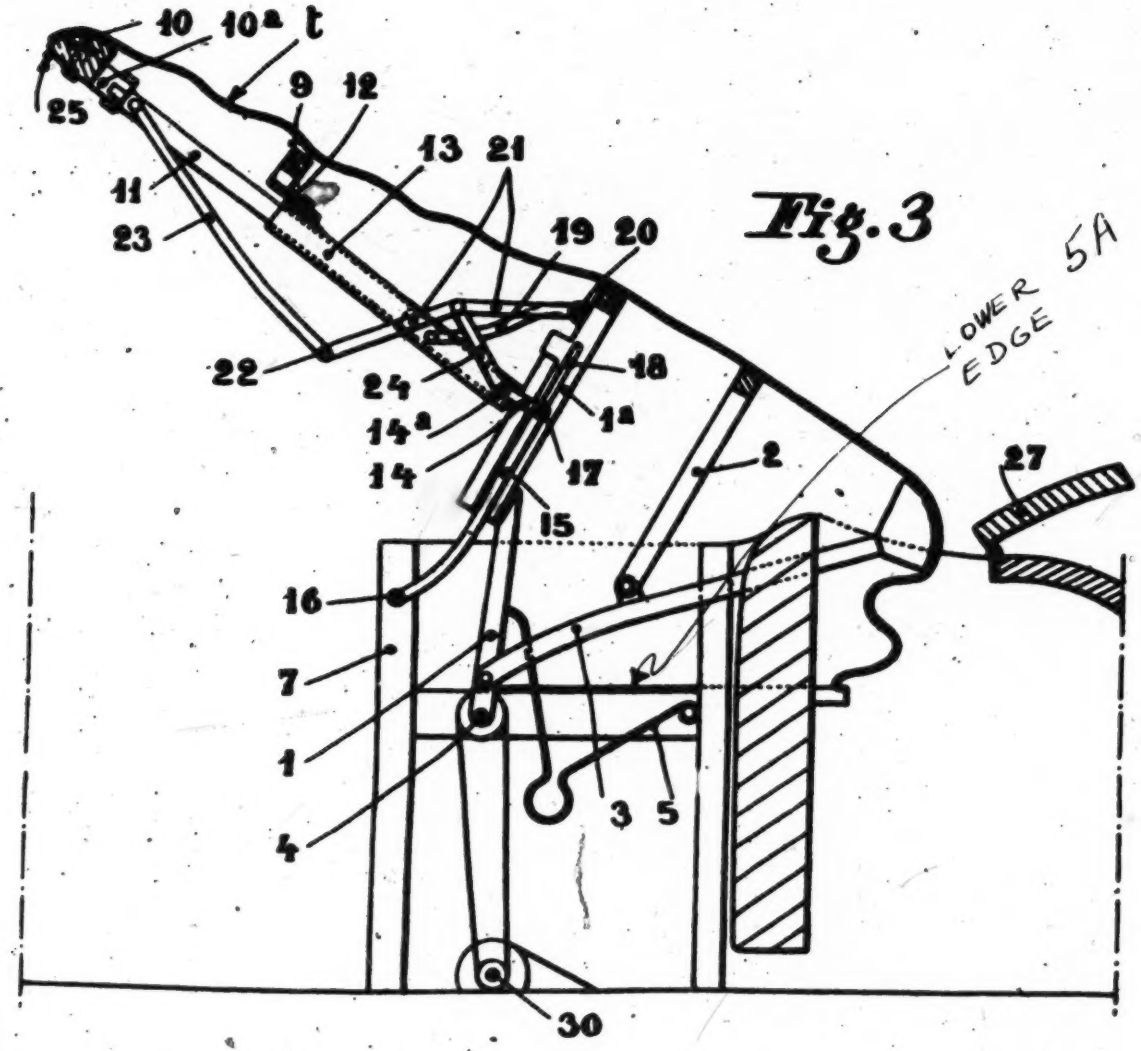
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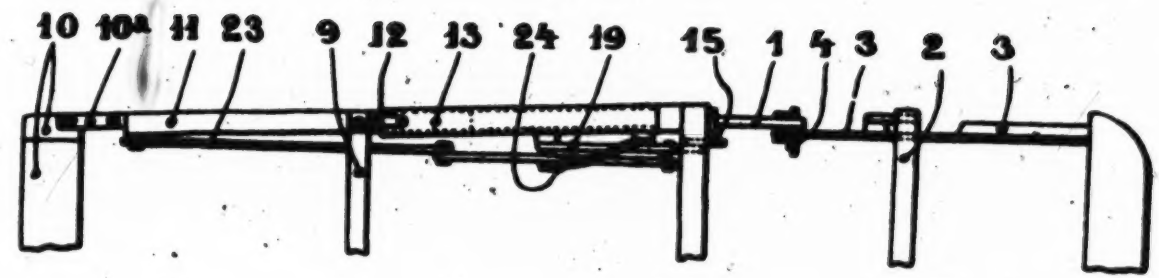
Fig. 3

Fig. 2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DEFENDANTS' EXHIBIT PP

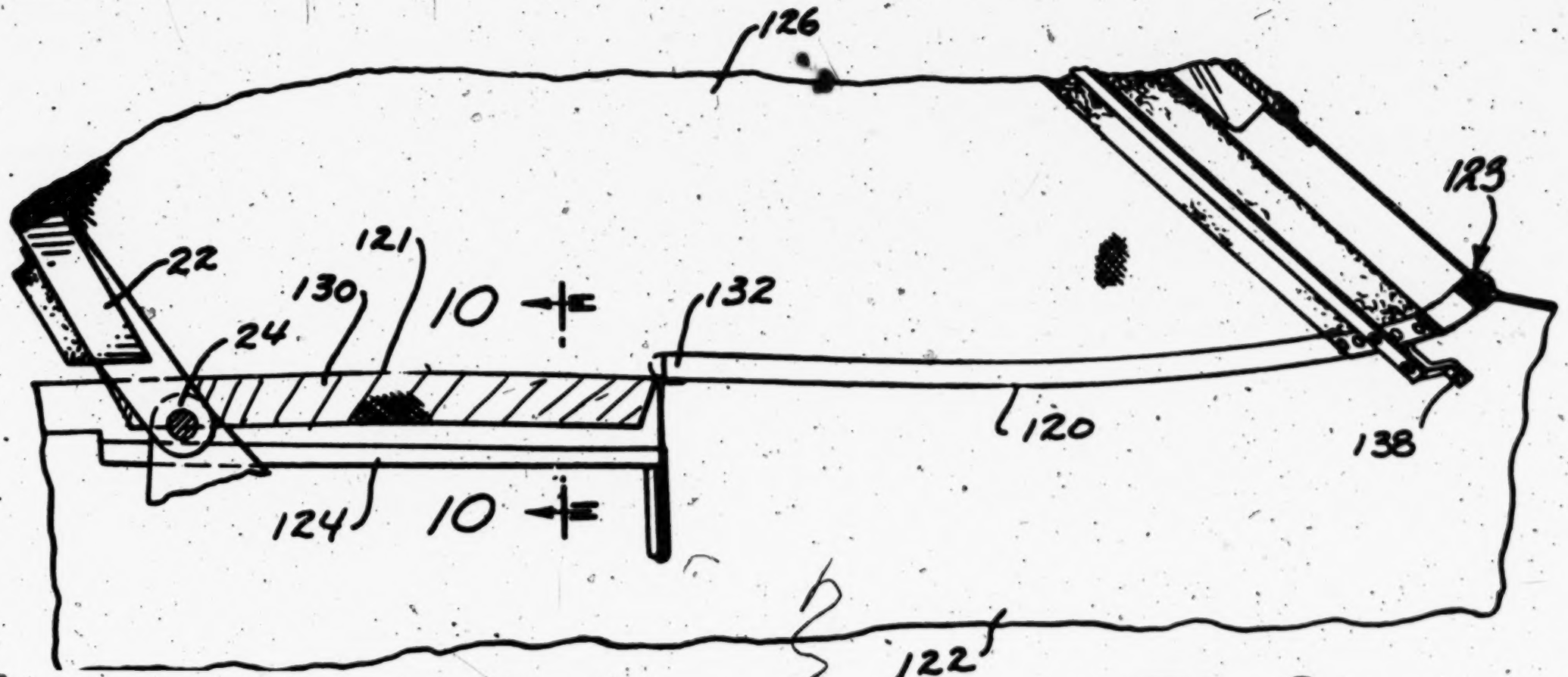
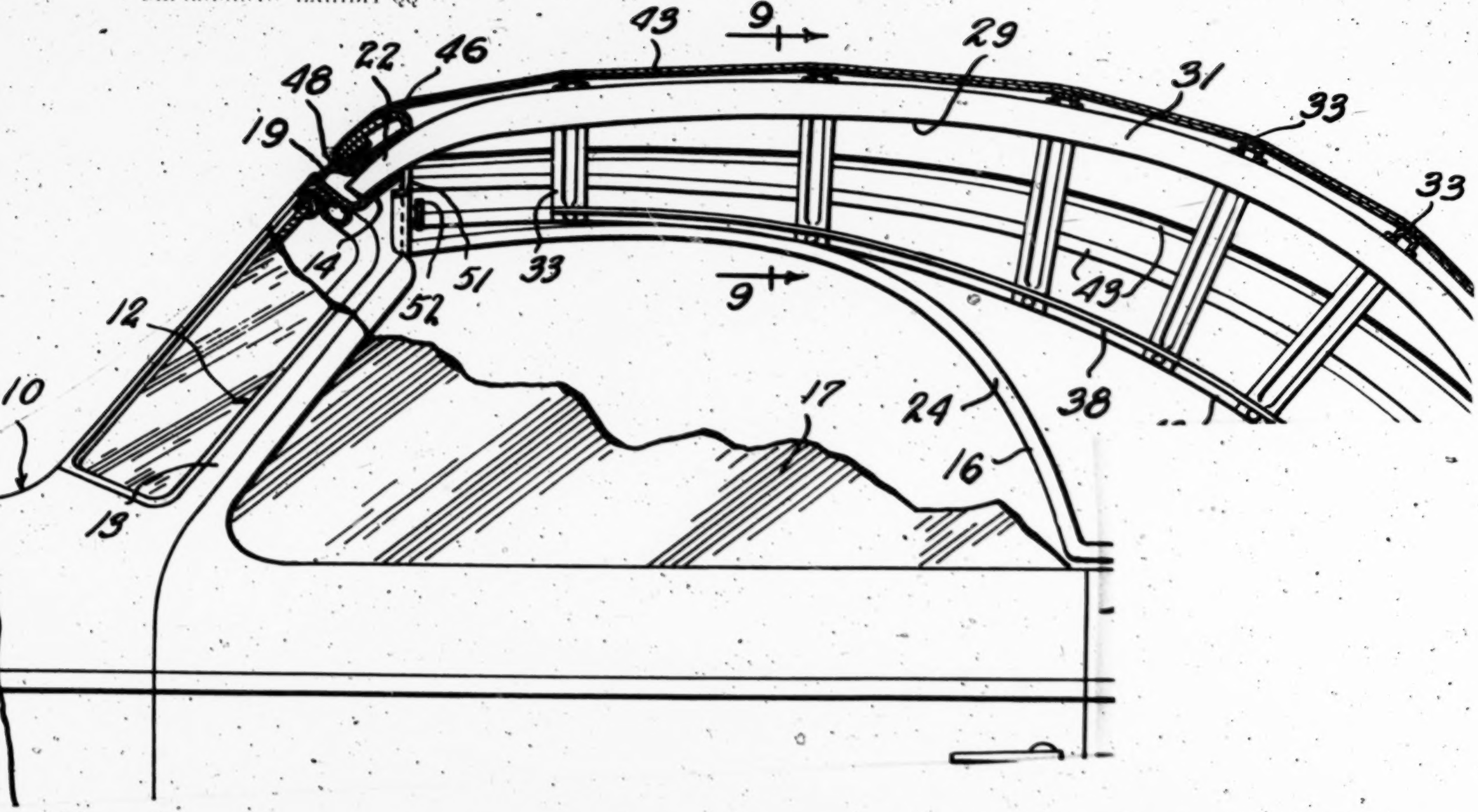
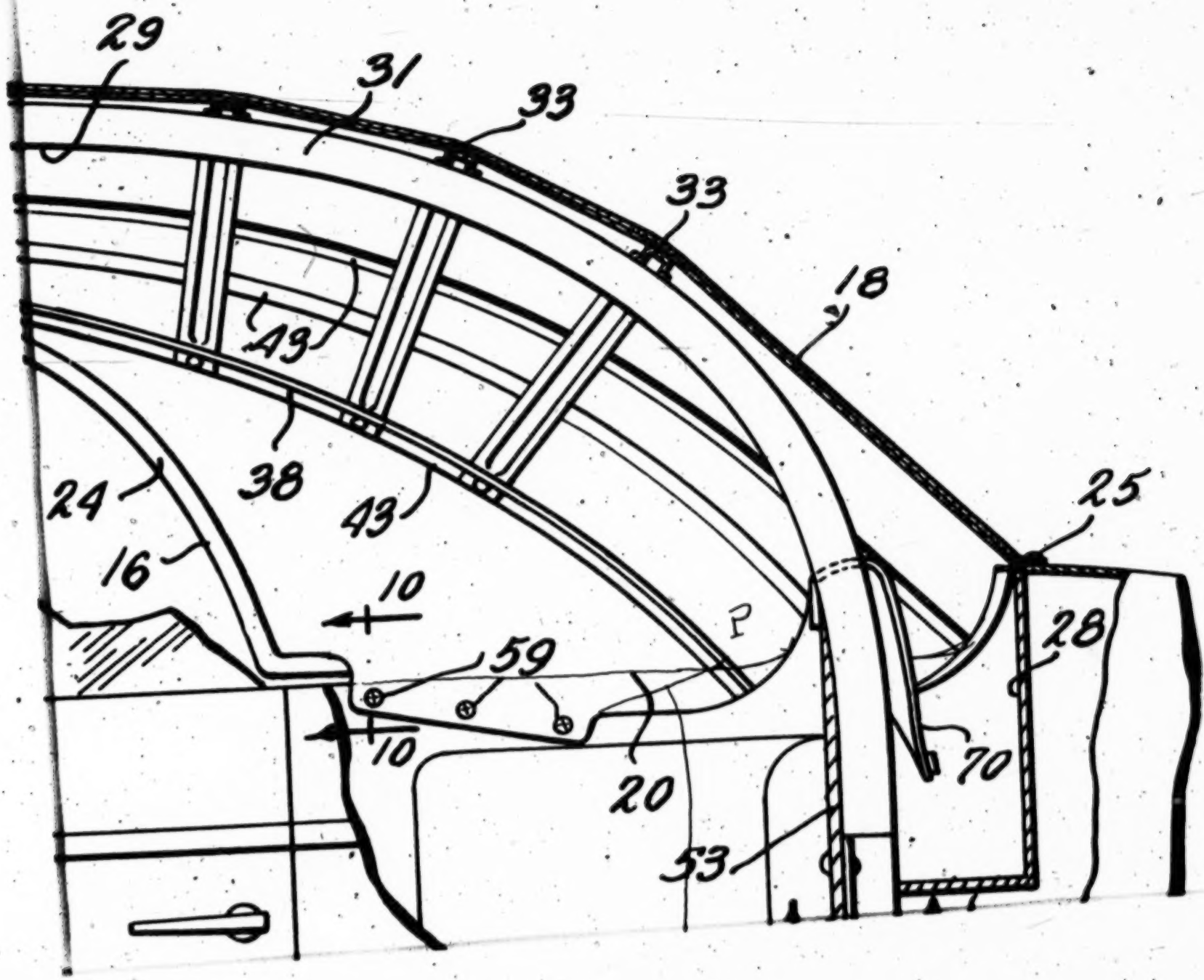


Fig. 9.

DEFENDANTS' EXHIBIT QQ

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9. In event Licensee sells to a third party who is also a licensee of AB, the present license agreement shall not apply nor will royalties be payable hereunder, and nothing herein shall constitute a waiver of AB's right to recover royalties from said third party under its license.

10. In event the parties have a dispute over the amount of unpaid royalty due to AB, either may call upon the Chief Judge of the U. S. District Court, for Maryland to appoint an arbitrator whose decision shall be binding.

11. Licensee agrees to report and pay AB for any royalty due for devices sold between the effective date of this agreement and the date of the last signature hereto within thirty days following the latter date.

12. In consideration of $1.00, payable by Licensee to AB within sixty (60) days from the date hereof, AB releases Licensee and its customers of any claim for infringement arising prior to the effective date of this agreement, provided that this agreement shall run continuously for at least one year and royalties be fully paid thereunder.

13. So long as Licensee renders full and accurate royalty reports and has made payments as they come due, it may terminate this agreement by giving written notice of termination concurrently with a timely royalty report and payment in which event the license will terminate with the end of the next royalty period.

14. In event Licensee adopts a selling procedure which is different from the selling procedures followed by other licensees of AB and which results in a lower effective royalty base for Licensee, then AB may require Licensee to pay such additional royalty as necessary to correct the inequality.

15. AB may terminate this license in event of a breach of the license terms, which is not corrected after thirty (30) days notice.

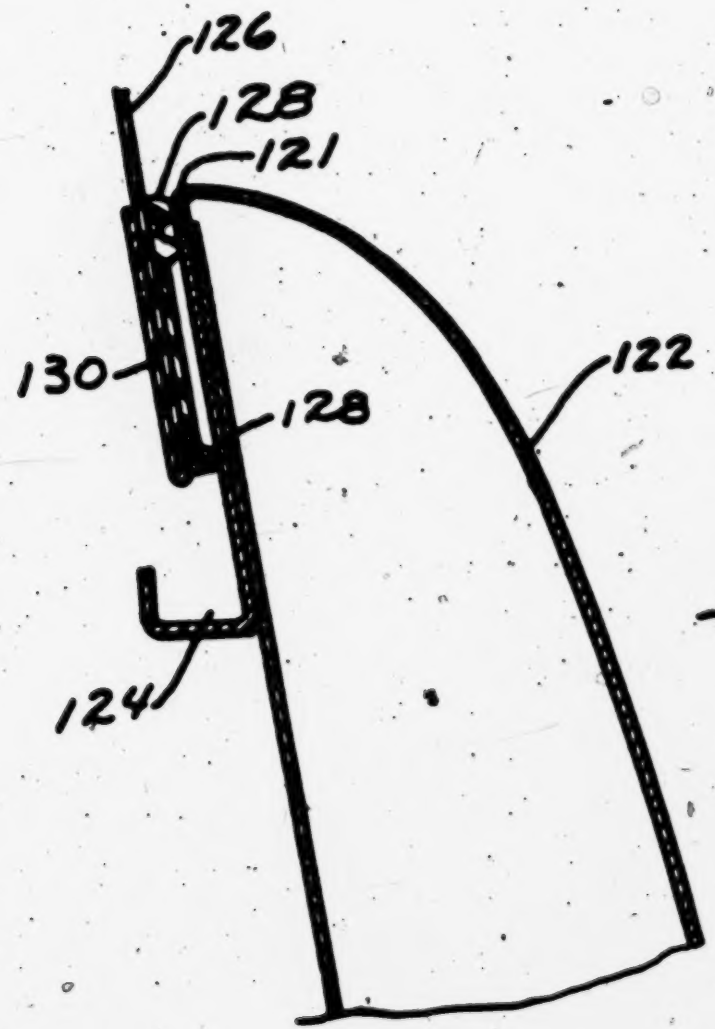
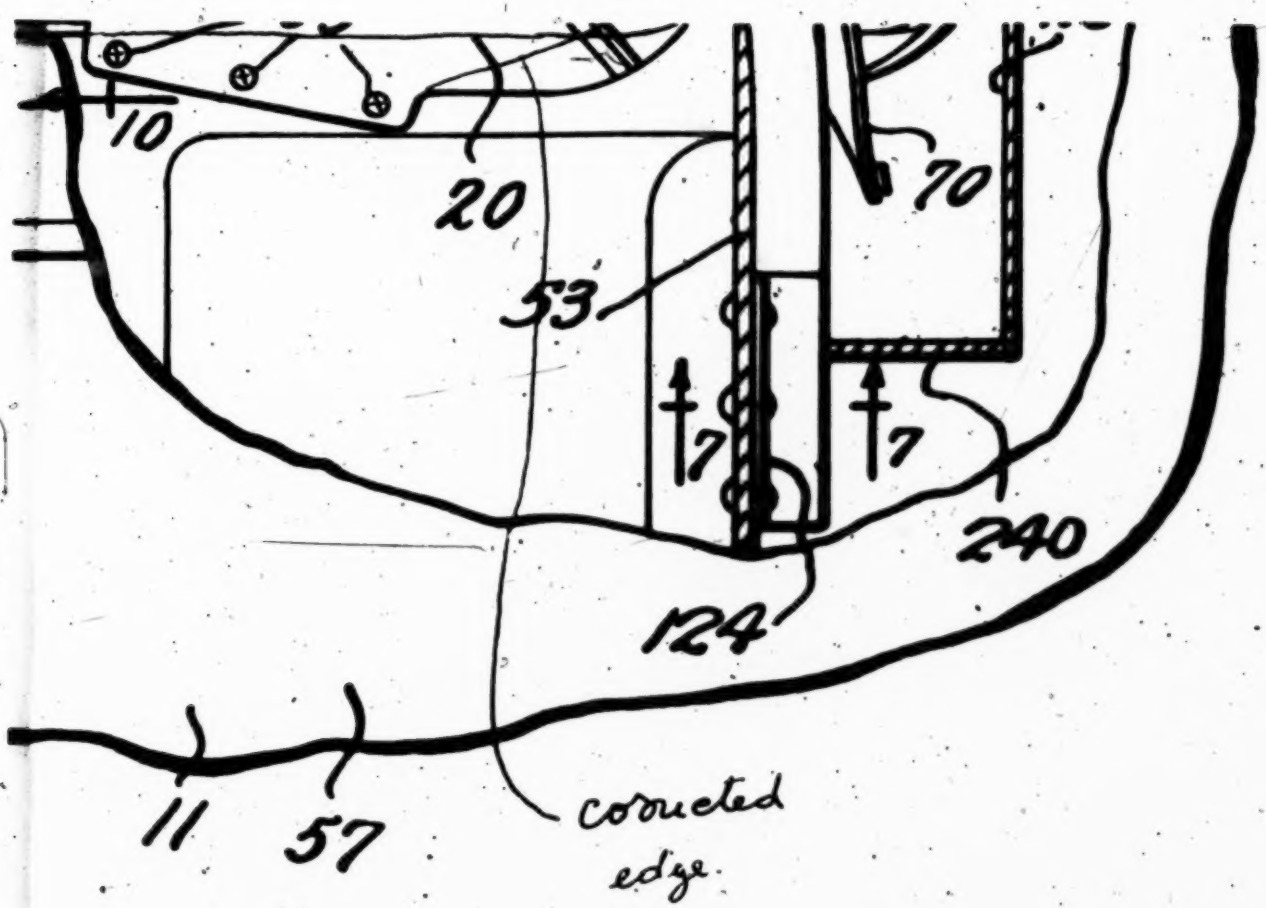


Fig. 10.

Fig. 3.


10
20
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53
7
7
240
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11
57
corrected
edge.